1 Introduction to Pi-Shells and their properties

Terms and Conditions

By Martin Brady

1.1 What The Theory Contains And the Documentation

The documentation initially describes the concepts of Pi-Shells and shows how Special Relativity can be described using Pi-Shells. We move onto Gravity with more diagrams and

explain Newton's Laws. In the section, More on Gravity, we move onto more advanced topics in Gravity such as wavelength shortening. This is mostly the theoretical underpinning of the idea of Pi-Shells getting larger and smaller. Also where does time come from and what is energy.

(Mostly diagrams and concepts and a little Math)

Introduction to Pi-Space for Beginners (Concepts and Diagrams, Special Relativity Explained)

Understanding Gravity in Pi-Space

More on Gravity in Pi-Space (More concepts and diagrams)

Newton's Laws

Once this is understood, we move onto the ideas of using the Law of the Sines and the Law of the Cosines for calculating General orbits and there is some sample Java code in Appendix A with a worked example.

(Some worked examples)

Calculating Orbits

Appendix A Java code for Orbits

The next piece which is unique to Pi-Space initially is the Advanced Formulas piece in Pi-Space. Here we use the previously defined Theoretical underpinning of Pi-Shells to derive new versions of established formulas like Kinetic Energy and Potential Energy. Here we have new formulas with derivations and comparative calculations for Einstein and Newton. There is also a table of other formulas too in the document, showing how we can derive Gravity. The aim of this section is to show worked example of Pi-Space formulas beyond just the diagrams.

(New Formulas Dervived From The Theory)

Advanced Formulas in Pi-Space (Completely New derived formulas based on the theory KE,PE etc; Table of Formulas)

Beyond this we move onto the Quantum work. Here we start with the Exponent and show how it can generate Pi-Shells. Pi-Space then deviates from current Quantum Mechanics and proposes a "Schrodinger's wish" equation which deals with waves and not just probabilities. We introduce the concept of Local and NonLocal waves. Inside this document, we then move onto explaining the reason for Turbulence and Lift, covering Bernoulli. The Navier Stokes equation is broken down into its constituent parts and a new version is derived at the end of the document. Heat, Convection, Advection and Pressure are discussed.

(Local and Non Local waves)

Quantum Theory (Extension to current Quantum Theory extending the Probability idea and Schrodinger Wave Equation to include Gravity and Fluid Dynamics plus explanation and reworking of Navier Stokes)

Once this is done, we move into the Advanced Quantum piece where we deal with “modern” Particle physics. Once again, a new concept is introduced, that of the “wave within wave” design pattern for reality. This is alluded to in the Quantum Doc. From here, we begin the task of explaining charged particles and non charged particles. The Standard Model is covered. Quarks, Bozons and Anti-Particles etc; There is also coverage of the String Theory and the basis of the proposed ten dimensionality of reality.

(The Standard Model and String Theory)

Advanced Quantum Theory (Explaining 10 Dimensions of String Theory, Where Mass comes from, Fine Constant, Particles, Standard Model)

After the standard model is reverse engineered into a Wave within Wave design pattern we move onto applying that design pattern to Temperature and Super Conductivity. The amendment to the Wave within Wave design pattern is to relate wave amplitude to Temperature. Also, the dampening of the waves is use to explain Bose Einstein Condensate and Super Conductive related effects.

Temperature and Super Conductivity

Building on the Wave within Wave, the concept of Temperature is introduced which maps to the wave amplitudes. Also, Super Conductivity and Super Fluids are covered. There is also a treatment of the P vs NP, SQUIDS and Boyles and Charles Laws. Einstein’s BEC is covered and the techniques to slow light down to a stop.

Fields and General Relativity

Here there is a definition of the FDx(y) notation which describes Quantum Field Points. From this we can define the Metric and Proper Time. Additionally, we reverse engineer General Relativity and explore the details of the theory.

The Particle, The Wave And The Momentum Shell

Momentum is modeled as a Wave within a Wave in the theory. Here I explain the De Broglie approach and how to visualize this in the Theory. Momentum Interaction Diagrams build on this approach.

Presently being worked on

Momentum Interaction Diagrams

In the document called Momentum Interaction Diagrams, classical interactions of particles are covered. This includes Elastic and Non Elastic Collision. New formulas are derived here and compared against the Classic Newtonian ones. All types of interactions are covered in this document.

Note: I am aware some of the documentation needs cleanup and this is an ongoing task.

1.2 Overview

This Section begins the process of formalizing Pi-Shells for those who are new to this Theory. It explains how they are formed and how we already have utilities for exploiting the certainty that they provide to us in terms of our Theorems in geometry and our classical laws. I also formalize 'The Square Rule' which is commonly used in Physics to unwittingly approximate the area of a Pi-Shell, based on its diameter. It's **very** important to understand the Square Rule as I'll show it's the basis, for example, in later understanding what $E=MC^2$ means from a Pi-Shell perspective. So please take some time to understand it. It's also very important to understand why Pythagoras' Theorem solves the way it does. An understanding of this later explains why Lorentz' Transformation works for Einstein's Special Relativity. Last but not least, do not proceed to the next Section unless you understand the concept of the Local Frame of Reference (Observer) and why you need to use it.

1.3 What is a Pi-Shell?

A Pi-Shell is an Observable Atom formed within our reality and is characterized by a Sphere. In Pi-Space, those Spheres can become larger or smaller depending on the forces on them and are also affected by being in the presence of an external field such as a Magnetic field or a Gravitational field. When a Pi-Shell compresses until is has no diameter, it returns to the Quantum Wave functions which created it. Alternatively, a Pi-Shell can be formed when Quantum Wave functions combine to form an Observable Pi-Shell. An Observable Pi Shell is formed as defined by the Schrödinger wave equation. The Observable Pi Shell has a relativistic diameter within our reality which will be covered in more detail shortly.

1.4 What is Pi-Space?

Pi-Space is our (human) frame of reference within this reality. It is not a wave viewpoint but rather a sphere based viewpoint. Our planet and our bodies are composed of atoms which are essentially tiny spheres AKA Pi-Shells. Pi-Space focuses on Pi-Shells and how they interact with one another and the external fields which affect them in terms of their diameter. In Pi-Space, the diameter of a Pi-Shell is more important than its radius as will be shown and from this we can determine potentials, force, velocity, distance and so on. Pi-Shells can also be thought of as another name for an Atom and whose properties I define here.

1.5 What is Space Time then?

Measuring ones Time in Space is an important part of Physics and is reasonably straight-forward in Pi-Space and quite intuitive. To achieve this clarity, Pi Space breaks up reality into different discrete pieces and covers time in that break-down.

1. Atoms are called Pi-Shells and have a relativistic diameter
2. A Pi Shell can be compressed and returned to the Quantum waves which formed it
3. A Pi Shell can be formed from combining Quantum waves
4. Different fields exist along-side Pi-Shells which affect the Pi-Shell's diameter
    a. Gravity field
    b. Magnetic field etc;
5. Importantly each Pi Shell has its own clock-tick and is also relativistic similar to the diameter of the Pi-Shell. Pi-Shells of the same diameter have the same clock-tick.
6. In Pi-Space, the maximum or fastest clock tick is defined by a Pi-Shell which has no diameter and has returned to its Quantum wave state AKA a wave traveling at the Speed of Light
7. A change in the diameter of a Pi-Shell changes its energy state, changing its Potential and Kinetic Energy and the force that it produces. Velocity and Acceleration are also tied into the diameter of the Pi-Shell diameter
8. Classical force is defined as one or more Pi-Shells colliding/interacting with one another and altering the diameter of one or more Pi Shells.
9. A field may interact with a Pi-Shell and alter its diameter. Therefore, it may be perceived from the Pi-Shell perspective as being a Classical force but it is really a field effect. However, from a measurement perspective, one can measure the field in terms of the diameter change and which can be mapped to a force using our understanding of Pi-Space and the Pi-Shells within it. This is discussed later.
10. Each Pi Shell is composed of wave functions and therefore has a discrete wavelength, related to the De Broglie wavelength.

If we combine all these straight-forward concepts, we can see very quickly that if Pi-Shells are either in the presence of other Pi Shells or in the presence of an external field this results in Pi-Shell diameter changes. This in turn affects the relativistic Pi-Shell clock-tick and we quickly see that Space and Time are glued intrinsically together. More details will be provided on this later. An important concept in Pi-Space is that each Pi-Shell has its own relativistic clock tick, as I'll show and that the maximum clock-tick is that of a Pi-Shell with no diameter which has become a Pi-Wave or Quantum Wave function. This speed of such a wave is what we call The Speed of Light in traditional Physics.

Note: In Pi-Space, the Pi-Shell clock-tick is always moving forward like a clock on the wall. Some Pi-Shell clocks are moving faster or slower than others but none are assumed to be moving backwards. In Pi-Space, to have a backward flowing clock tick would require that the Quantum Waves which forms the Pi-Shell or Pi-Wave would be moving backwards through time. Typically, we are in the realm of Anti-Matter for a Wave Function to exhibit such a behavior and is outside the scope of this theory. However, in Pi-Space, one can connect a location which is clicking more slowly with a place which is ticking more quickly via a tunnel of some kind and go back to the past relatively speaking but both frames of reference are moving forward through time although at different speeds.

1.6 Defining A Pi-Shell and The Square Rule

A Pi-Shell is based on what we call a traditional Sphere whose constant is Pi. The Sphere has a fixed diameter. The Pi-Space field is the first building block. A Pi-Shell is very predictable and measurable as its geometry is based on Pi and its diameter/radius. It is the basis of our Reality.

The area of a sphere is

$$4\pi r^2$$

where r is the radius. The first logic jump into Pi-Space is to define the area of a Pi-Shell in terms of its diameter and not its radius. Therefore, the area of a Pi-Shell is

$$\pi d^2$$

where d is the diameter. *This is called The Square Rule in Pi-Space and is one of the foundational formulas of Pi-Space.* The surface of a Pi-Shell is composed of Waves which have distinct wavelengths. When the wavelengths are changed either by a field such as Gravity or an External force, the diameter of the Pi-Shell is altered.

The circumference defined in terms of the Pi-Shell diameter is

$$\pi d$$

1.7 Understanding the Properties of a Pi-Shell

In the Pi-Space theory, the Pi-Shell can represent different notions ranging from Archimedean antiquity to modern Quantum Mechanics. Here is a break down of the properties of a Pi-Shell. First, I'll define the Pi-Space laws up front and then explain them.

1.8 The Pi-Space Laws

The first law of Pi-Space is a Pi-Shell with larger velocity will have a smaller diameter relative to the observer.

The second law of Pi-Space is that Newtonian velocity is defined in terms of an observer's Pi-Shell divided into v diameter units each measuring d/c (where d is the diameter of the observer's Pi-Shell and c is the Speed of Light).

The third law of Pi-Space is that a Pi-Shell with diameter equal to zero is traveling at the Speed of Light and is no longer a Pi-Shell but a wave.

The fourth law of Pi-Space is that any observer can be defined in terms of Pi-Shells having a diameter d. An observer who does not have Pi-Shells of a constant size is said to be unbalanced whereas if one has constant sized Pi-Shells, one is said to be balanced. An observer is assumed to be balanced unless otherwise stated.

The fifth law of Pi-Space is that an observer's Pi-Shell diameter is assumed to be sized 1 unless otherwise stated.

The sixth law of Pi-Space is that the energy of a Pi-Shell can be defined in terms of its surface area times its mass.

The seventh law of Pi-Space is that the area of a Pi-Shell can be approximated by the formula πd^2 or d^2 which is called the Square Rule where we ignore the constant π.

The eight law of Pi-Space is that Pythagoras' Theorem solves because it is using the Square Rule and is therefore a Pi-Space Theorem

The ninth law of Pi-Space is that the Lorentz Transformation is also a Pi-Space Theorem because it's using Pythagoras' Theorem

The tenth law of Pi-Space is that mass, length and time are properties of the Pi-Shell area defined in terms of the Observer's diameter

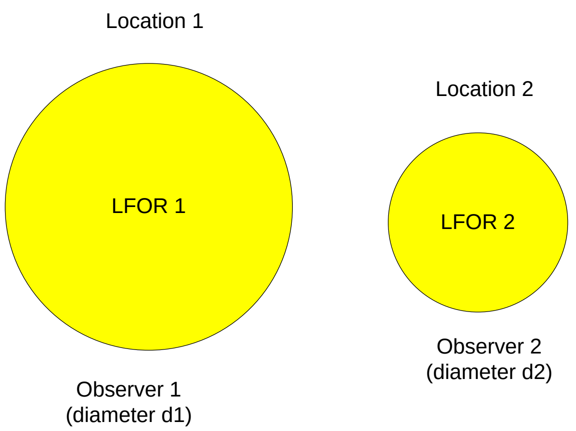
1.9 The importance of the Observer in a relative system

Why do we need relativity at all? In Pi-Space, the answer is clear. The reason why we need relativity is that we cannot determine the absolute diameter of a Pi-Shell. We only know the size of our own Pi-Shell diameter and those relative to us. We therefore pick a Pi-Shell which we call the Observer and use the Observer's diameter as the normalized diameter and all measurements are made relative to this one. Therefore, in a Relative System, we have an Observer diameter and other diameters are expressed Relative to this diameter size. Please do not proceed if you do not understand this concept. So, let's build on this simple idea.

A key concept to understand with Pi-Space is the importance of the Observer in a Local Frame of Reference (LFOR). In a relative system where no absolute measurement can be made, we assume the Observer's measurement is locally absolute and we take relative measurements from this viewpoint. For an observation to be made in our reality, it is made from a position sometimes by an Observer or a device which acts as an Observer. The device or observer is composed of one or more Pi-Shell which has a particular diameter. The surrounding Pi-Shells can either be the same diameter or different. The place where the observation is made is called the Local Frame of Reference or LFOR in Pi-Space short-hand. It can be a physical position, possibly on an embankment, watching a train pass by or a

particle traveling near the speed of light. If the surrounding Pi-Shells have the same diameter, then the LFOR is said to be 'balanced'. If they do not have the same diameters, they are said to be 'unbalanced'. This is similar to the Newtonian idea of balanced versus unbalanced forces, as Pi-Shells are projectors of force as I'll show.

Principally, in order for a measurement to be made or taken, it is done relative to an Observer in a LFOR and we select a Pi-Shell which has a particular diameter. In Pi-Space, not all Pi-Shells have the same diameters because velocity and other forces such as Gravity alter the diameter of the Pi-Shell. Using this Relativistic approach, we can pick any Pi-Shell to be the so-called Observer. An Observer does not have to be a human who is watching. An Observer Pi-Shell is the fully qualified name but mostly this Pi-Shell will be referred to as the Observer in short-hand.



1.10 Velocity and the Observer's Pi-Shell

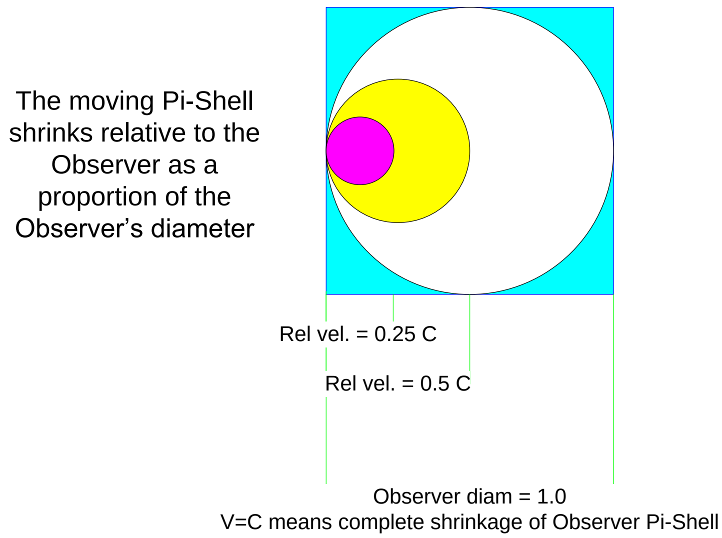
The Pi-Shell of a stationary observer within the LFOR has a diameter d. What diameter size can be assigned to the Observer Pi-Shell diameter? Using a relativistic system of Pi-Shell measurement, we assign diameter = 1.0 to the size of the Observer Pi-Shells, *no matter what Observer we are dealing with*. Galileo showed us that it's impossible to know one's absolute velocity and by implication, it's impossible to know the absolute diameter of a Pi-Shell.

A simple example of this is to try and calculate your absolute velocity. You might be stationary as you read this but the Earth is moving around the Sun and the Sun is moving with the Galaxy and the Galaxy is moving with all the other Galaxies. Before you know it, it becomes virtually impossible to calculate all the velocity additions.

By using a relative system, we are instead concerned with the relative differentials around us. If, for example, an object is said to be moving faster than us we say that it has velocity v relative to us as the Observer. From a Pi-Shell viewpoint, the Pi-Shell is smaller and thus the relative Pi-Shell diameter size is <1. So the smaller a Pi-Shell, the faster it moves, this is a fundamental rule in Pi-Space. When a moving Pi-Shell diameter has size = 0, it has velocity=C, no matter which Observer we are dealing with. At this point it becomes a Wave and has QM properties. The diameter of every Observer Pi-Shell has max velocity V=C and is equal to relativistic diameter size 1 from the perspective of the Observer Pi-Shell. It represents the upper limit on velocity as no further shrinkage of the Pi-Shell is possible. *This is why the Speed of Light is a constant, no matter which Observer we are dealing with.*

In Pi-Space velocity is thought of as the shrinkage of the Observer's Pi-Shell.

If we want to draw this in Pi-Space, rather than re-draw a Pi-Shell shrinking, we instead draw the Observer Pi-Shell and draw an inner Pi-Shell representing the degree of shrinkage of the Observer Pi-Shell which means we are essentially drawing two Pi-Shells; one inside the other. The advantage of this is that we can draw V<=C for the Observer Pi-Shell and not just put a dot or a tiny wave on the page. Next I'll show how a small refinement to this maps directly to Newton's Velocity concept.



The colored sectioned in this diagram represent different degrees of possible shrinkage relative to the Observer Pi-Shell.

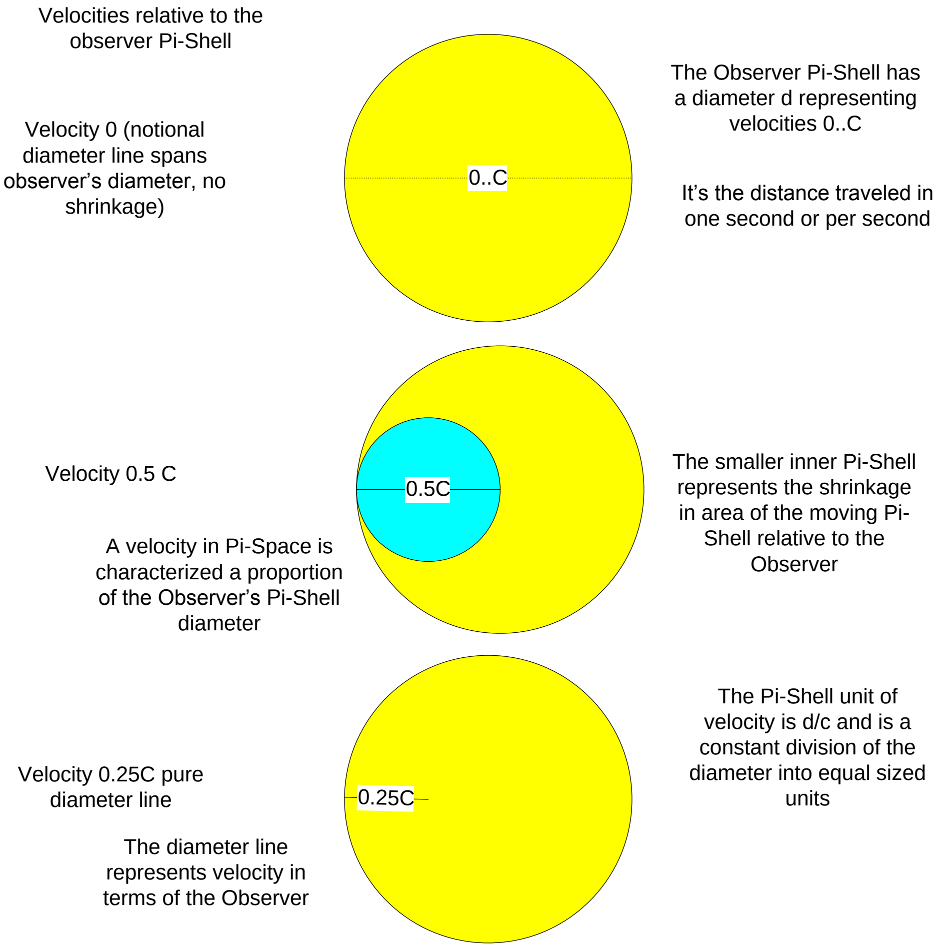
1.11 Newtonian velocity and the Pi-Shell Diameter Line

First, let's define Newtonian Velocity in terms of the observer's Pi-Shell. The total diameter of the observer's Pi-Shell is d. A smaller relative Pi-Shell represents a velocity v>0 and a relative Pi-Shell with diameter d=0 represents v=C relative to the observer. Firstly, we can represent the total diameter of the Observer Pi-Shell in terms of the velocity range 0 to C because this represents the shrinkage of the Pi-Shell as it increases velocity.

How do we represent Velocity in Pi-Space? The answer to this is to use the Pi-Shell Diameter Line.

In the diagram below, the length of the Observer <u>diameter line</u> represents velocity as a proportion of C relative to the Observer Pi-Shell. <u>Velocity represents how much an observer's Pi-Shell area has shrunk represented as a proportion of the Observer's diameter.</u>

Once more the diameter of a Pi-Shell plays an important role in Pi-Space. It can be used to directly reflect the Newtonian concept of Speed. The vector component will be discussed shortly. Of course, Newton thought that V could be > C, nonetheless this is Velocity as understood from a Pi-Shell perspective. Please take a look at Einstein Velocity addition if you're curious about what to do when velocities U + W > C from a Pi-Shell perspective.



Therefore we can divide up the diameter of the observer's Pi-Shell into Pi-Shell units of velocity as follows

$$pieshellunitofvelocity = d/c$$

From the diagrams above, we see that Newtonian Velocity can be expressed as the diameter line

$$diameterline = v\left(d/c\right)$$

When the observer diameter d is defaulted to 1, one gets

$$\left(observervelocity\right)diameterline = v/c$$

So we can see here how Pi-Space already bridges the gap between Newtonian velocity and Einstein Special Relativity in a straight-forward manner. The value of the diameter d differs between Observer diameters and we'll need to take this into account as we move forward. Therefore, relativity is built into Pi-Space from scratch. As we move forward, I'll expose all of the Special Relativity formulas and expose their meaning in Pi-Space.

1.12 Different Observer diameters and the need for Einstein's SR work

Why do we need Special Relativity? In Pi-Space, the Pi-Shell diameter is different for different observers. Consider a person sitting on a chair in their home and another person sitting on board a high speed train. Both have relative velocity zero as they are stationary in their respective LFORs. However, their Observer Pi-Shells are not the same size. The person on board the high speed train has a relatively smaller Pi-Shell even though they are traveling at zero velocity. The diameter of a Pi-Shell is not constant, it shrinks with velocity.

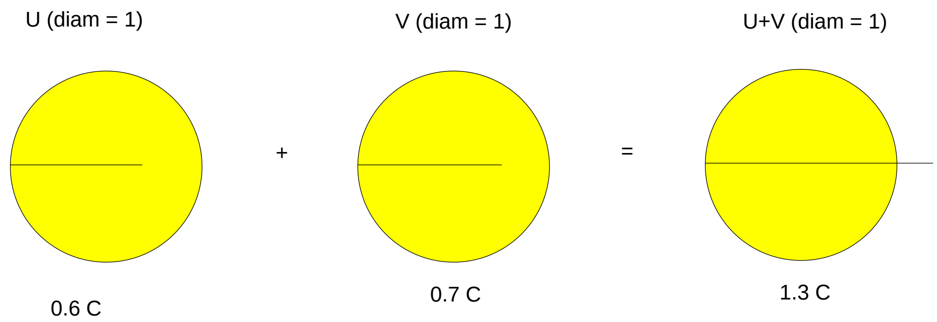
In Newton's world view, the Pi-Shell unit of velocity is assumed to be the same from all Local Frames of Reference. What the Einstein SR equations do is they adjust the size of the velocity based diameter line of the Pi-Shell based on the difference in the sizes of the Observer diameters. The Einstein Addition of Velocities formula is a very good example of this. Let's start with this.

1.13 Einstein's Addition and Subtraction of Relative Velocities

Addition of relative velocities is about adding Pi-Shells of different sizes. An important point to note is that it's not only about adding Pi-Shells of different sizes but *also* relating that combined Pi-Shell velocity in terms of an observer.

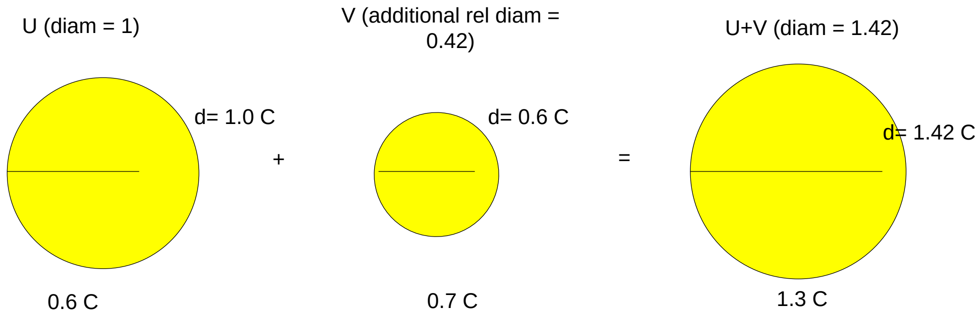
So what is an observer then? An observer is composed of Pi-Shells with a particular diameter. So we need to relate the combined Pi-Shell in terms of an observer's Pi-Shell. Another important point about velocity is that it is a pure Pi-Shell diameter calculation, so we're dealing with the adding and scaling of Pi-Shell diameters.

Let's take an example, adding velocities 0.6 C to 0.7 C = 1.3 C in the Newtonian world. This maps to two Pi-Shells each with diameter 1 (non relative)



The Newtonian Viewpoint

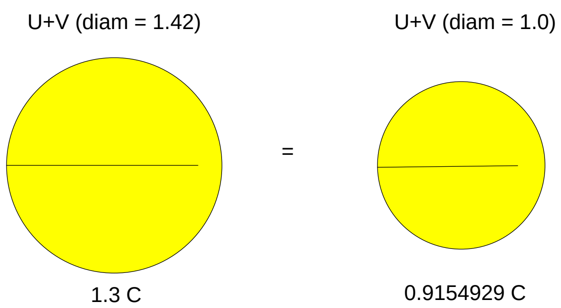
We end up with an answer > C which is incorrect. In reality of course, the Pi-Shell shrinks as move moves faster, so (U) 0.6 C is a Pi-Shell with diameter 1 based on the initial observer and (V) 0.7 C has a smaller diameter because it's based on observer U, therefore we get an answer < C. What is the size of this smaller diameter? It's 0.6 * 0.7 = 0.42. Why is it this value? Well 0.6 is relative to the stationary velocity with diameter 1.0 so it's 0.6 * 1.0 = 0.6 and 0.7 is relative to 0.6, so it's 0.6 times 0.7 giving us a revised diameter of the V Pi-Shell having 0.42 relative to U's Pi-Shell diameter. Now we have a revised diagram.



The Einstein Viewpoint
(relativistic)

So we get a combined diameter of 1.42 relative to U and a combined velocity of 1.3 C. However, we want velocity defined in terms of the observers Pi-Shell diameter which is sized 1 (e.g. the stationary observer watching the train pass in the Einstein example). Therefore we need to represent this velocity in terms of the observer with diameter = 1, not diameter = 1.42. Importantly, velocity is proportional to the diameter so we can scale the diameter back to 1.

$$1.42 = 1.3C$$
$$therefore$$
$$1 = 0.9154929C$$



The Einstein Viewpoint (adjusted
to observer Pi-Shell)

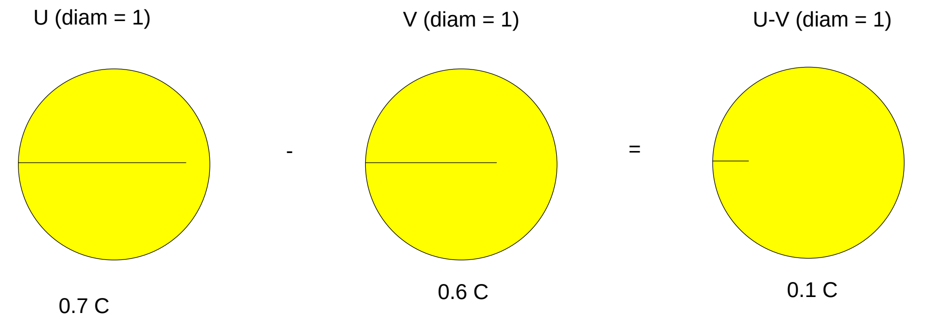
This is the same as the Einstein velocity addition formula, hopefully a little bit clearer when explained in Pi-Shell terms!

$$\frac{u+v}{1+{uv}/{c^2}}$$

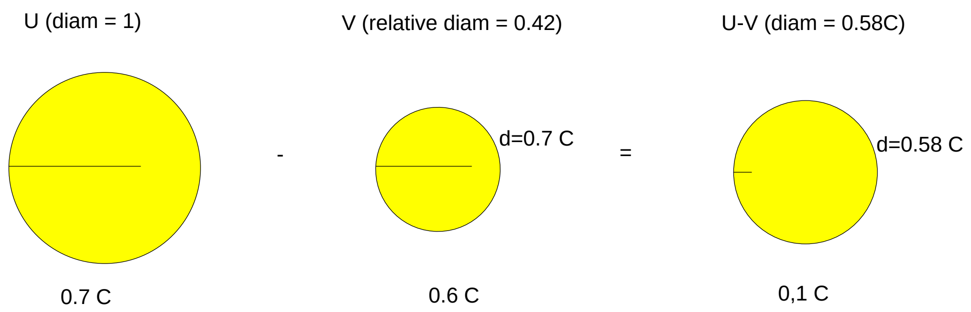
Addition of velocities of approaching object uses a similar formula

$$\frac{u-v}{1-{uv}/{c^2}}$$

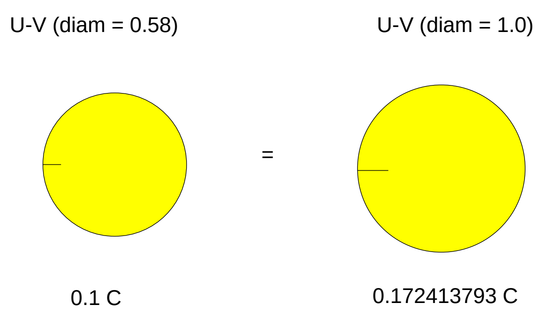
However, here we are subtracting the velocities. We can draw this using the same principles as outlined above. Let's take the example of two objects approaching one another, one traveling at u = 0.6C and the other approaching at v = 0.7C. What velocity does u see v approach? The obvious non-relative solution is 0.1 C. If we place the values into the formula, the answer is 0.17241379 which is larger than we imagined. Therefore, the resulting non-relative Pi-Shell is undersized and has to be scaled up to match the stationary observer's Pi-Shell.



The Newtonian Viewpoint



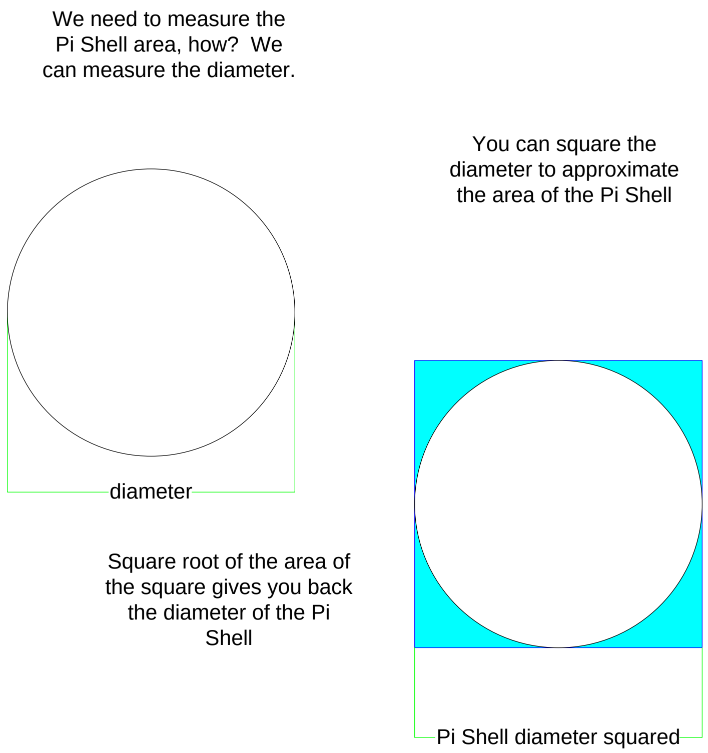
The Einstein Viewpoint
(relativistic)



The Einstein Viewpoint (adjusted
to observer Pi-Shell)

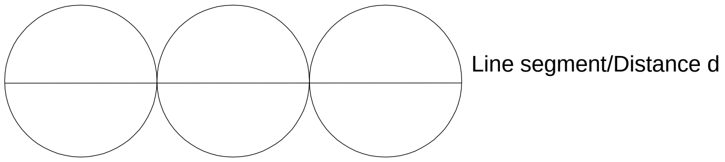
1.14 More on the Square Rule and Defining Euclidean Space

How can we figure out the area of a Pi-Shell if we only have the diameter? *We can use the Square Rule. The Square Rule states that the area of a Pi-Shell can be approximated by the diameter^2. The only loss in accuracy is π which is a constant.*



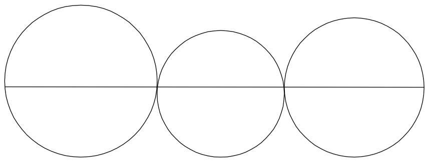
Also, note that in Pi-Space, a distance d can be expressed in terms of the sum of a set of Pi-Shell diameters. Additionally, a line segment l can also be expressed as a sum of Pi-Shell diameters. When the Pi-Shells which make up a line segment or a distance d have the same diameter, this is considered to be a Euclidean view of Pi-Space. Later, Einstein showed us that Euclidean space did not hold, in Pi-Space we model this as Pi-Shells having different diameters. Later, I'll show how different diameters can be due to fields effects and/or Pi-Shells exerting force on one another.

All diamaters are the same



Euclidean View

Some diameters are different

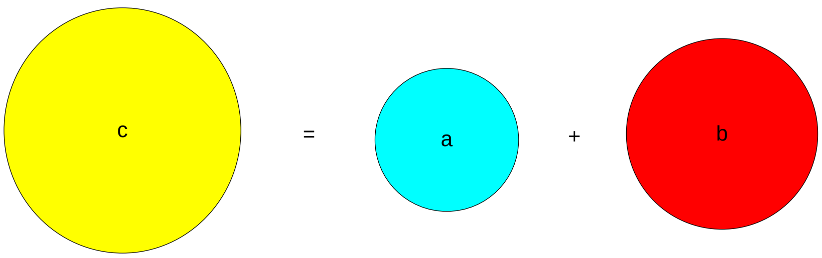


Non-Euclidean View (Einstein warped Space-Time view)

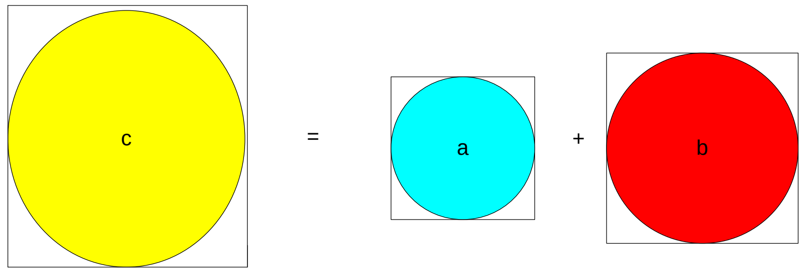
1.15 Pi-Shell area addition and Geometric Relationships

Geometry flows naturally from Pi-Shells because they are three-dimensional. In the Pi-Space Theory, Pi-Shells form our Reality within Pi-Space. There are some fundamental relationships between Pi-Shells and Geometry. Let's consider the case where we want to add the area of two Pi-Shells to produce a third Pi-Shell. Let's call the two Pi-Shell we wish to add Pi-Shell *a* plus Pi-Shell *b*. Pi-Shell *c* is the resultant Pi-Shell whose area is the combined areas of Pi-Shells *a* plus *b*.

Importantly, the diameter of the Pi-Shells forms our unit of length (or distance). So one can measure Pi-Shells in two ways; *either by area or by diameter*. Typically, we measure lengths using rulers. This is essentially measuring combined Pi-Shell diameters.

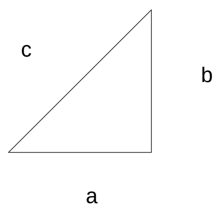


Next we use the Square Rule to approximate the area of the Pi-Shells, so we can draw this diagram in the following way.



We can therefore express this area relationship purely in terms of the diameters which more closely resembles our traditional concept of line segments.

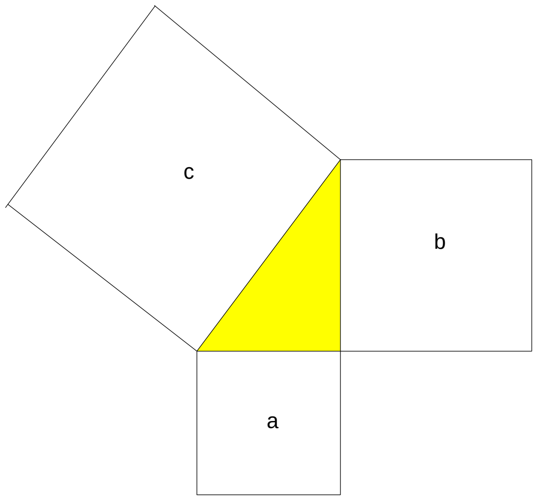
This relationship in and of itself isn't that interesting except for one other very interesting point. We can assemble these line segments into an enclosed triangle. The only way they will connect where the areas combine correctly *is to form a right angle triangle.*



Therefore a right angled triangle is a geometric expression of Pi-Shell addition in terms of the Pi-Shell diameters and where the combined Pi-Shell areas of *a* plus *b* equal the area of Pi-Shell *c*. This leads onto the meaning and importance of Pythagoras' Theorem. Understanding the importance of this Theorem in Pi-Space is of equal importance to understanding The Square Rule as it is foundational.

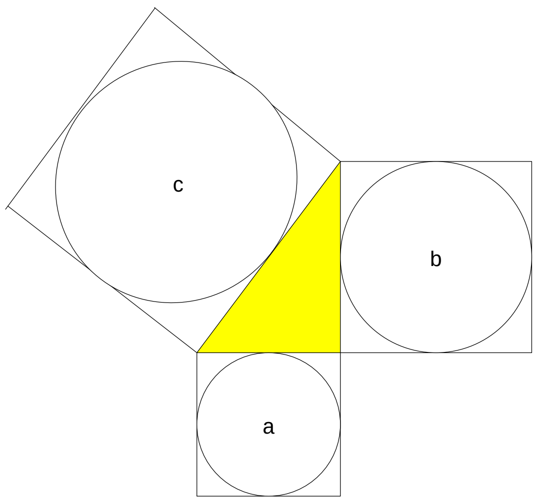
1.16 The Importance of Pythagoras' Theorem

What is so important about Pythagoras' Theorem? The answer is that explains how our geometry works at a very basic level. In Pi-Space, our Reality is composed of Pi-Shells. These are the underlying building blocks of our Reality and its geometry, so there is a direct relationship between Pi-Shells and the Pythagorean Theorem. To understand the theorem, one must first realize that the units of our reality are Pi-Shells; the dots are in fact Pi-Shells. I'll show how the Pythagorean Theorem is also a Pi-Space Theorem. The existing Pythagorean geometric proof (one of many) is based on drawing squares from the sides of the right angle triangle.



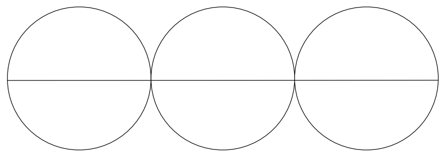
$$c^2 = a^2 + b^2$$

This can be modified to include three Pi-Shells using the Square Rule.

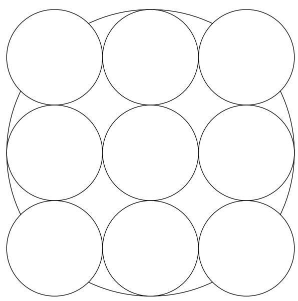


$$\pi c^2 = \pi a^2 + \pi b^2$$

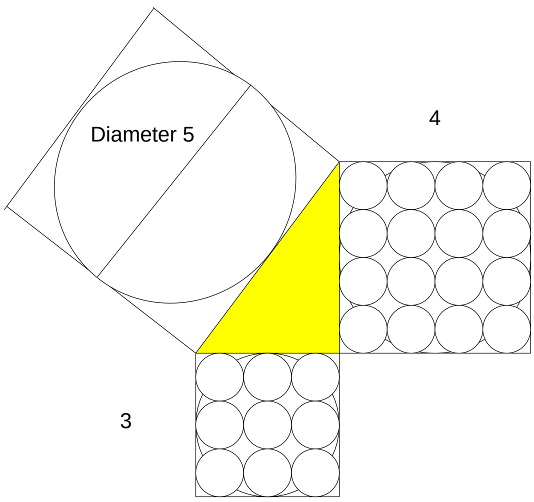
The only problem with this approach is that we are not dealing with three Pi-Shells. We are dealing with three line segments, made up of multiple Pi-Shells. For this relationship to work, the measurement is done in a non-accelerating framework (or a weak Gravity field which appears Euclidean). In fact, the Pi-Shells have a constant diameter (or are very close to equal in a weak Gravity field which shall be explained later). If they do not have an equal diameter, the Pythagorean Theorem fails as shown in General Relativity. However, when we use this theorem on Earth the margin of error is so small due to the weak gravity, we do not detect it while using a ruler. This same General Relativity principle applies in Pi-Space. The reason the Theorem fails is that one cannot approximate a larger Pi-Shell using smaller ones of a fixed diameter using the Principle of Pi-Shell Equivalence (explained shortly). This is not to be confused with the Einstein Principle of Equivalence which I'll discuss later. So for the Theorem to work, the length of a line segment is the sum of the (same sized) diameters in this case.



This brings us onto the Principle of Pi-Shell Equivalence. *The Principle of Pi-Shell Equivalence states that the geometry of a large Pi-Shell is maintained in groups of smaller Pi-Shells where their diameters remain constant.* Therefore, for example, the geometry of a Pi-Shell of diameter three can be approximated by nine Pi-Shells of diameter sized one, or 36 of diameter sized 0.5. The chosen unit size can be anything you'd like. It could even be one nanometer wide. The important thing is that the Pi-Shells have the same diameter.



Therefore the Principle of Pi-Shell Equivalence is used implicitly by Pythagoras' Theorem. In later sections, I'll also show how Newton also used this approach to approximate the Gravitational constant for a planetary body.



Pythagoras's Theorem using the Square Rule and the Principle of Pi-Shell Equivalence

By using the Principle of Pi-Shell Equivalence, we can turn each line segment into an equivalent Pi-Shell of a larger size, so the Theorem reduces to comparing three Pi-Shells; each one representing a line segment, which is the Pi-Shell's diameter. The area of Pi-Shell c is the sum of the area of Pi-Shells b and c when they are at right angles to one another. We return the result in terms of the Pi-Shells' diameters which are in turn related to the smaller Pi-Shells making up each line segment.

One again, I ask the question: What is so important about Pythagoras' Theorem? Now that we understand how it works from a Pi-Shell perspective, what becomes clear about the Theorem is that it *explains Pi-Shell area addition of two Pi-Shells a plus b and their result c in terms of their diameters.*

At a very simple level, one can view Pythagoras' Theorem as a Pi-Space Theorem. Pythagoras shows us how to add two Pi-Shells together, representing the Pi-Shells both in terms of their area (which is the Squared part) and the diameter of the Pi-Shells (which is the line segment part).

Note that although

$$\pi c^2 = \pi a^2 + \pi b^2$$

We can also express this relationship in terms of a subtraction, or a loss of area of Pi-Shell c.

$$\pi c^2 - \pi a^2 = \pi b^2$$

What is so important about this? We don't need it for Einstein Pi-Shell velocity addition because Newtonian velocity divides a diameter by C into equal units. However, it becomes important for properties of the Pi-Shell which are related to the area of the moving Pi-Shell; properties such as relative time, mass and the unit of length. We need it for Special Relativity where we have an Observer Pi-Shell c and where there is loss to that Pi-Shell and we want to express that loss in terms of a proportion of a Pi-Shell diameter. This is covered next in the Lorentz section dealing with his transformation and how he used it in conjunction with Einstein's SR work.

1.17 Lorentz's Application of Pythagoras' Theorem to Velocity

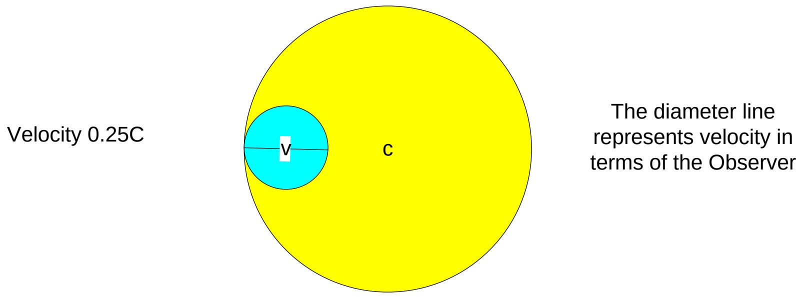
Einstein realized that Speed of Light C is a constant for all Observers. He also realized from his work on Electro-Magnetism that relative moment produced a contraction of the moving object. In order for this to be true, Einstein realized that distance, time and mass must be relativistic.

So, if someone is moving with velocity v, their clock tick for example is slower than someone who is stationary. Einstein enlisted the help of Lorentz in this thought experiment and produced the Lorentz-Fitzgerald contraction formula which is the basis of much of Special Relativity.

$$\gamma = \sqrt{1 - \frac{v^2}{c^2}}$$

However, implicit in this understanding is that each Observer is unaware that their clock-tick is running slower. The way to visualize this in Pi-Space is to imagine two LFORs. The first LFOR has smaller Pi-Shells than the other. The smaller LFOR has a slower clock-tick because its Pi-Shells are smaller. However, Pi-Shell diameters are shorter so reality is scaled-down so-to-speak but the proportions remain the same. Speed of light C works out the same for all Observers because this is the total contraction of an LFOR and it's the same for all Observers.

Before going any further, let's derive the Lorentz-Fitzgerald contraction in Pi-Space using Pi-Shells. It's more straight-forward than one might think. Let's revisit the case where a Pi-Shell is moving at 0.25C relative to the observer Pi-Shell.



We're still missing something obvious (which you may have already noticed). What is this? Take a look at the above diagram. It shows us the observer's Pi-Shell in yellow and the amount by which the area has shrunk due to velocity which is in blue. However, it does not show us what the size of the moving Pi-Shell is in terms of either area or diameter. Put simply, this is the blue area subtracted from the yellow area. This produces the resulting Pi-Shell which is doing the actual movement. We only know the amount of shrinkage due to velocity. One might think that it's a case of merely subtracting diameter 1 from 0.25 C to get a Pi-Shell of 0.75C. This is incorrect because we need to first find what sized Pi-Shell can be formed from the remaining area of the observer's Pi-Shell and from there derive the diameter. How can we do this mathematically?

The answer is to use an ancient theorem which I have already discussed. We use Pythagoras' Theorem. We need to subtract the area of the observer Pi-Shell from the area due to shrinkage and find the size of the moving Pi-Shell. One might well ask, why do we need to find this out?

The answer is that we use this answer to figure out how much slower time is in the moving Pi-Shell, how much smaller is the unit of length and how much greater the mass is relatively speaking compared to the stationary observer. *This is the Lorentz-Fitzgerald Contraction described in terms of Pi-Space.* The measurement of time, the unit of length and mass are all related to the change in length of a Pi-Shell's diameter.

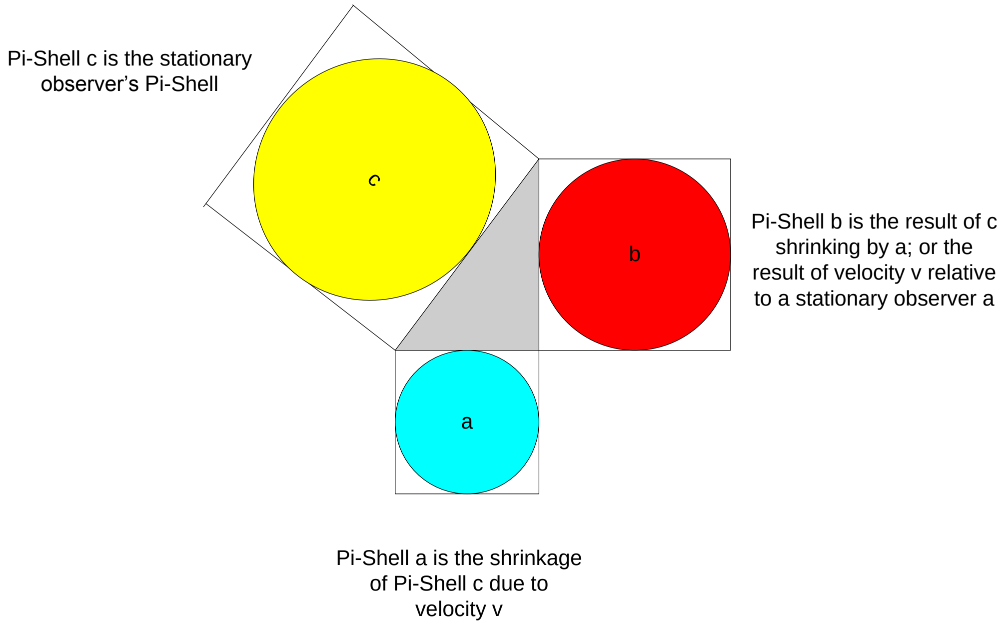
We can approximate the size of the observer Pi-Shell and the amount of shrinkage due to velocity using the Square Rule. Let's call the diameter of the observer's Pi-Shell c and the diameter of the Pi-Shell representing shrinkage due to velocity a. To find the area of Pi-Shell with diameter b, we need to subtract the area of c from a.

$$\pi c^2 - \pi a^2 = \pi b$$

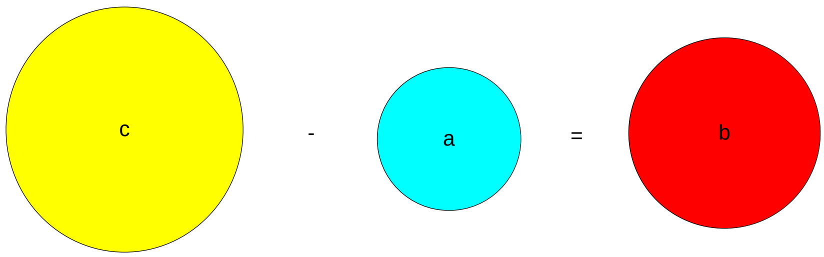
This leads to the Pythagorean Theorem

$$\pi c^2 = \pi a^2 + \pi b^2$$

From this we get the geometric picture



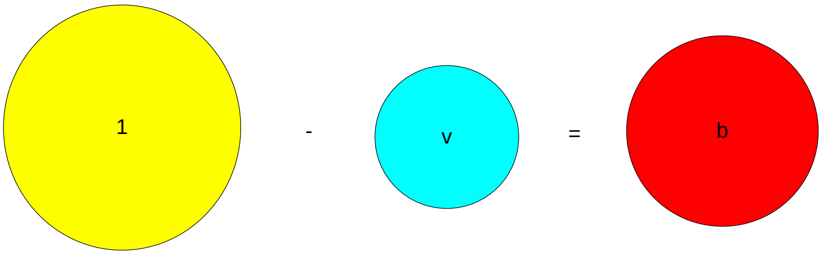
This diagram essentially represents elementary Pi-Shell subtraction



One can ask the question, how much smaller is Pi-Shell b in comparison to Pi-Shell c expressed in terms of c's diameter?

$$\pi c^2 = \pi a^2 + \pi b^2$$
$$b = \sqrt{c^2 - a^2}$$

Pi-Shell c is the observer Pi-Shell so its diameter is sized 1 and Pi-Shell a is the shrinkage due to velocity so its diameter is velocity v relative to the observer.



Velocity v is expressed in terms of total diameter c. Plus we use the square rule to get the areas of the Pi-Shells and then square-root to get back the diameter.

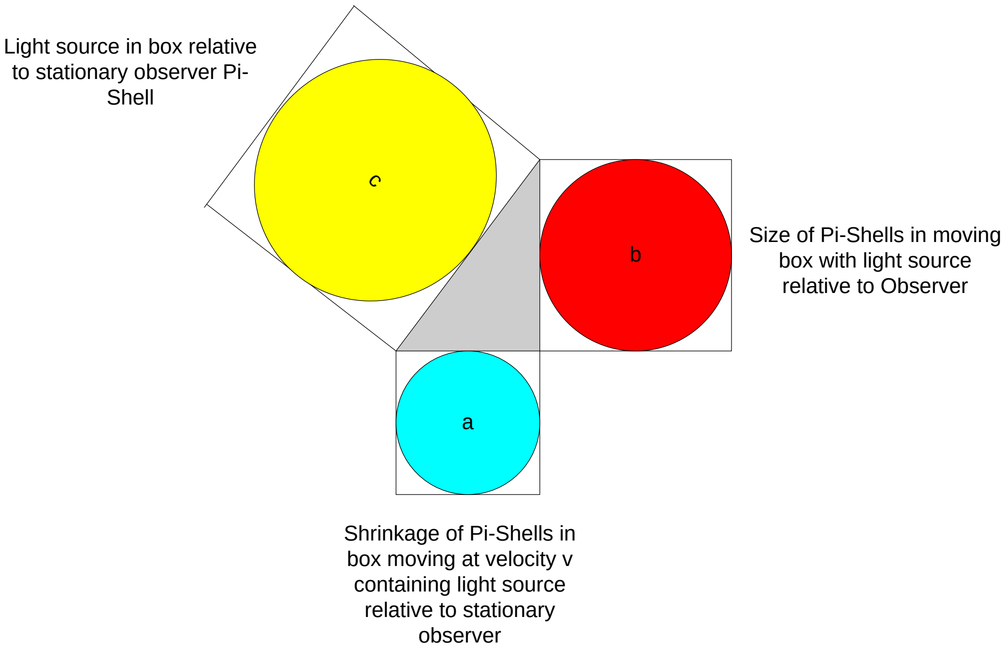
$$b = \sqrt{1 - \frac{v^2}{c^2}}$$

Let's take an example, a Pi-Shell with velocity 0.5 C, gives us Pi-Shell b having a diameter of 0.8660254 relative to the observer. This is how much smaller it is.

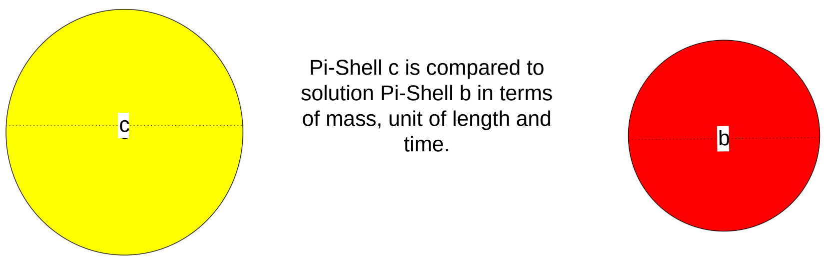
This formula is the foundation of the Lorenz-Fitz Transformation. I have derived it using Pi-Shells rather than via the Einstein approach and hopefully it's far more intuitive. It is essentially calculating the contracted size of a Pi-Shell due to velocity. However, I'd like to discuss the Lorenz experiment further to flush out any further hidden detail.

The Lorentz Transformation is derived from an experiment where light from a light source is bounced off a mirror at distance L and which rebounds back distance L to a detector which ticks with each light pulse. The light source, mirror and detector are placed in a box. There are two local frames of reference. The box moves at velocity v and the ticks are measured by a stationary observer and also by an observer within the moving box itself. Both observers measure the speed of light at c but relatively speaking, the clock ticks are slower for the moving observer in comparison to the stationary observer.

Lorenz solved this problem by measuring the distance that the light travels up to the sensor and back for both the moving viewpoint and the stationary viewpoint. The light source travels a longer distance up to the sensor relative to the stationary viewpoint because the box is also moving at velocity v away from the observer. The distance the light travels within the box to the sensor, independent of velocity is the shortest length. Lorenz used two different time variables t. From this Lorenz constructed a right-angled triangle and solved using Pythagoras' Theorem.



From this we get two Pi-Shells c and a. Pi-Shell c is the Pi-Shell of the stationary observer. Pi-Shell a is the Pi-Shell of the moving frame of reference.

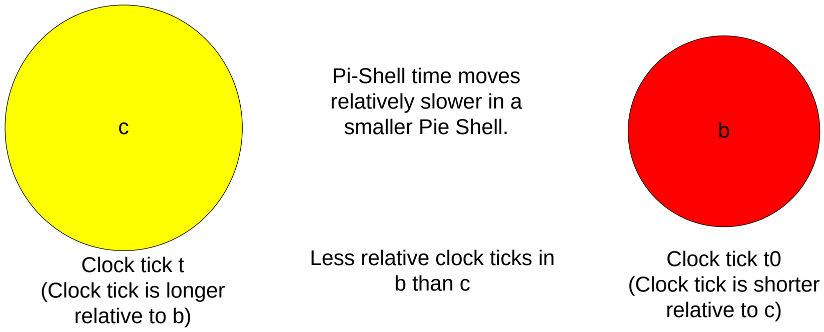


From this, we can derive a formula called the Lorentz Transformation which explains the ratio of the two Pi-Shell sizes to one another in terms of their diameters.

$$\text{Diameter of Pi-Shell c} = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}} * \text{Diameter of Pi-Shell b}$$

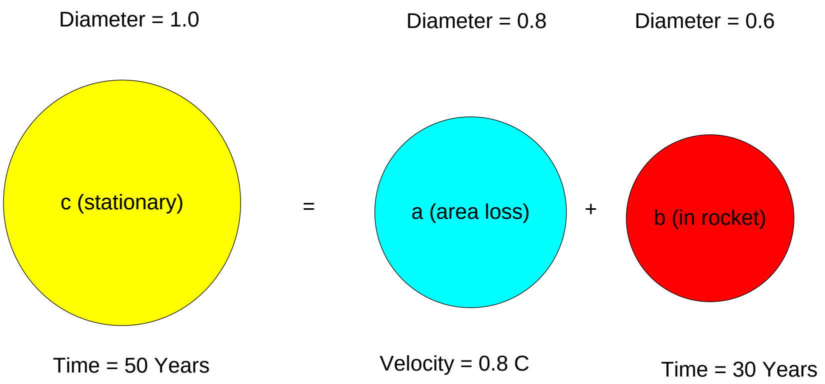
1.18 Solving for Pi-Shell time

One of the interesting aspects of Pi-Shells is our concept of time is a property of our Pi-Shells. Pi-Shell time is proportional to the diameter of the Pi-Shell. A smaller Pi-Shell relative to an observer indicates that the clock tick in the smaller Pi-Shell is smaller relative to the Observer and therefore time (and the clock tick itself) moves slower relative to the larger Pi-Shell.



$$t = \frac{t_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$

Each Pi-Shell has its own clock tick length. Applying the example of an astronaut traveling at velocity 0.8c for 30 years, we get 50 years for the stationary observer. The Lorenz Transformation for 0.8c yields a Pi-Shell b moving diameter of 0.6.



The ratio of Pi-Shell b diameter to Pi-Shell c diameter is 1/0.6 = 1.66667

$$Diameter\,\alpha\,Time$$
$$0.6 = 30 Years$$
$$Therefore$$
$$1.0 = 50 Years$$

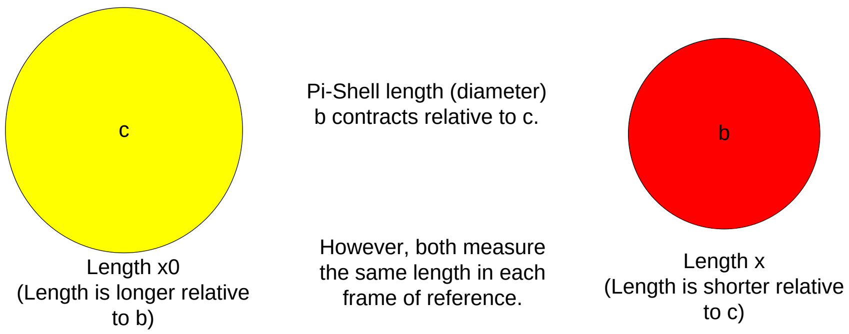
One can ask, where does time ultimately come from? In the Pi-Space Theory, time is related to the wavelengths that constitute the Pi-Shell. Smaller Pi-Shells are made up of shorter wavelengths (see De Broglie section). The shorter the wavelength the shorter the clock tick.

1.19 Solving for Pi-Shell unit of length

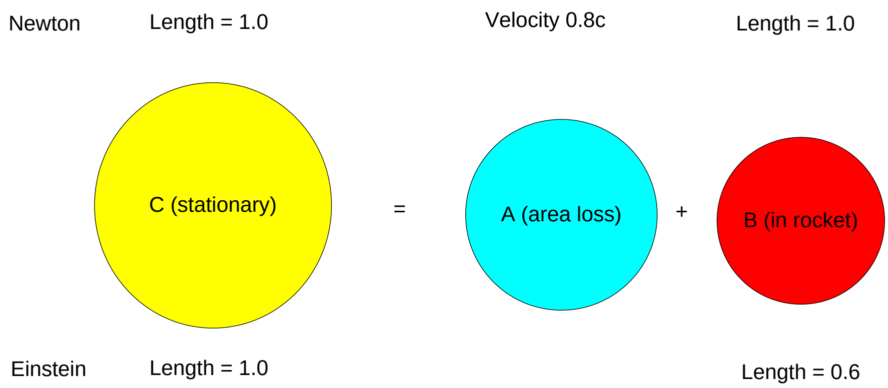
In the Einstein work, the ship traveling near light speed contracts in the direction it is traveling. In Pi-Space, the ship is built from Pi-Shells whose diameters are shrinking as they increase velocity. One can measure a distance in either frame of reference and one will obtain the same distance. Take for example, a ruler which measures length. The ruler will shorten as the observer moves faster so one meter or one foot will be shorter in a faster

moving LFOR. Ones unit of measure has also shrunk as it is composed of Pi-Shells in whatever frame of reference one is in.

The shrinkage occurs relatively in the moving frame of reference so x0 displayed below is the stationary observer Pi-Shell compared to x which is the moving frame of reference. Therefore we multiply x0 by the Lorenz Transformation instead of dividing by it as it the case with time. So the contraction in length is from the perspective of the observer (who is not contracted relative to Pi-Shell b).



$$x = x_0 \sqrt{1 - \frac{v^2}{c^2}}$$



On an interesting note from the section on time, both Pi-Shells c and b experience the same number of clock ticks but the size of the clock tick different. This raises the next question, then why can't the astronaut on the space ship detect things slowing down? The answer is to do with the geometry of Pi-Shells. The Pi-Shell unit of length is also shrinking by the same degree as time is slowing down. The unit of length is also proportional to the diameter of the Pi-Shell. Therefore, the ship is contracting in length as the unit of time is slowing down. Both contract by equal amounts so speed of light for example has the same measurement in all frames of reference.

$$speed = \frac{distance}{time} = \frac{d}{t}$$

For v=0.8c, our new understanding of observer speed must include the diameter adjustment of the moving Pi-Shell. We add the diameter component to the traditional Newtonian equation. We need to scale distance and time respectively.

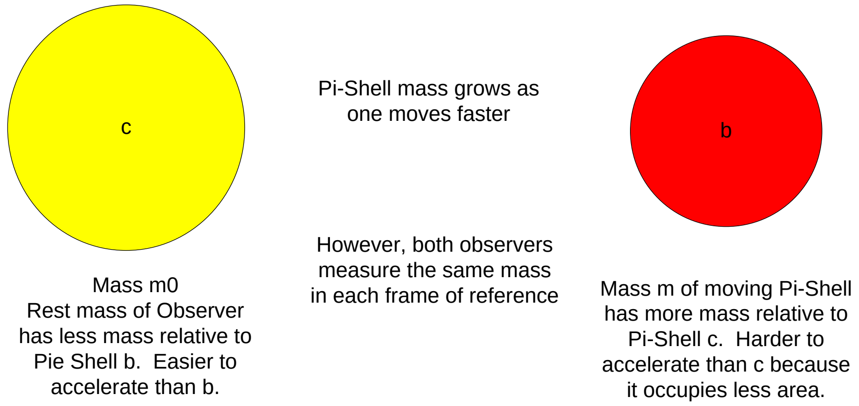
$$speed = \frac{d * 0.6}{t * 0.6} = \frac{d}{t}$$

Therefore, all Pi-Shell frames of reference measure speed with the same value across different observers. By implication, the Speed of Light is the same for all observers even as the Pi-Shell diameter changes. This is a very nice design.

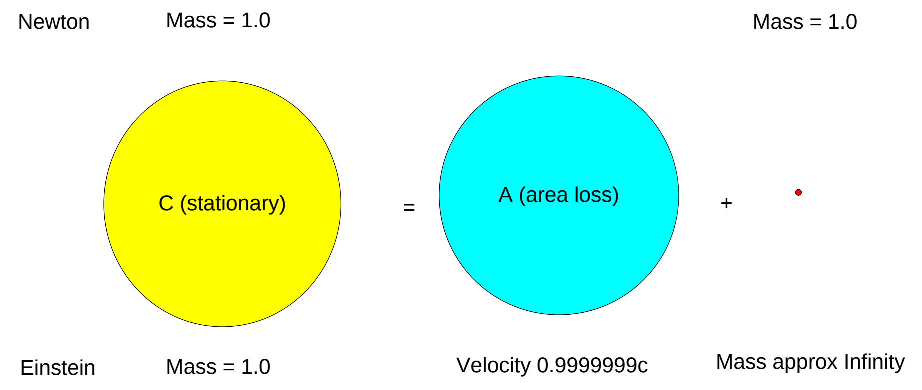
Note: In Pi-Space, contraction of the Pi-Shell is related to its diameter which defines unit length. The Pi-Shell does not turn into an ellipse. It remains a Pi-Shell.

1.20 Solving for Pi-Shell mass

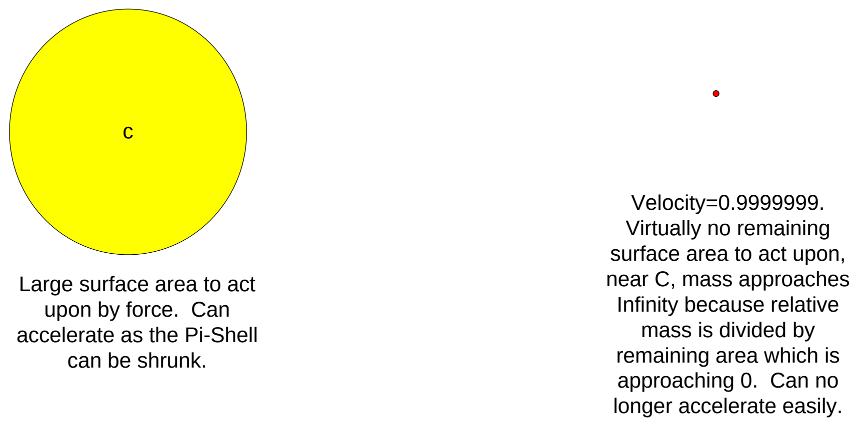
The Lorentz Transformation can also be applied to mass. Once again, mass is a property of a Pi-Shell. The Mass of an Atom is contained by a Pi-Shell. As a moving Pi-Shell shrinks the Mass density increases because the surface area decreases. To accelerate a Pi-Shell means to shrink its size by means of some kind of external force. The harder it is to accelerate a Pi-Shell, the more mass it must have using the Newtonian analogue (as we only have mass and acceleration making up force). The perception is that it has somehow become heavier or has more Inertia. Einstein was not happy with the description of mass and preferred that a system that describes momentum and energy which is more complete. I'll deal with this shortly. However, for the purposes of SR and this equation, we deal with mass alone as defined in the equation. The experiment which demonstrates the change in mass is when a particle is placed in a particle accelerator. As the particle approaches the speed of light, it becomes harder to accelerate the particle, therefore from a Newtonian view point it has grown heavier or has more inertia. There comes a point where one can provide an infinite amount of energy to produce no acceleration on a Pi-Shell. Here mass is deemed to have become infinite from the Einstein viewpoint.



$$m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$

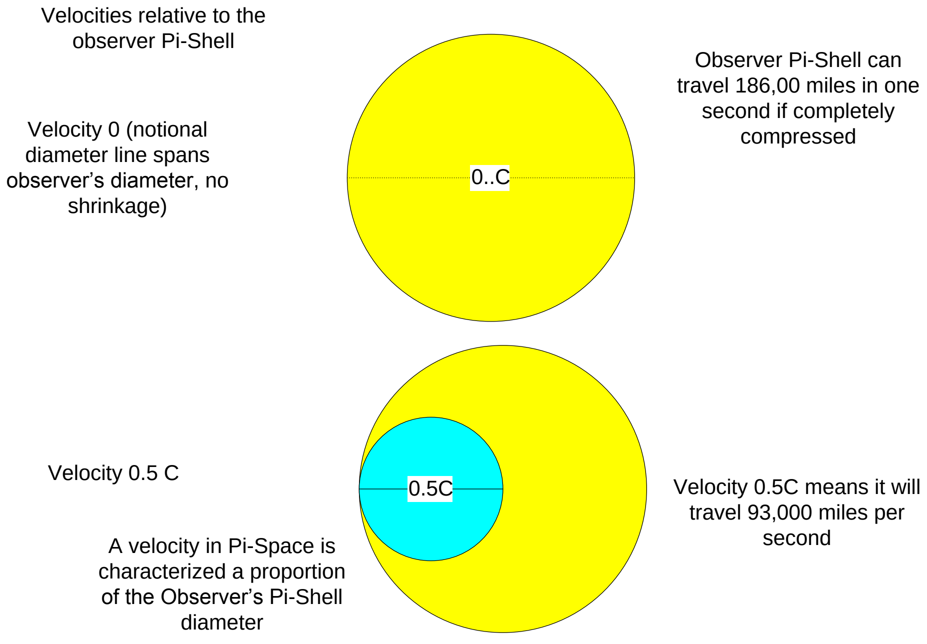


What is happening from a Pi-Space viewpoint is that the Pi-Shell is shrinking in terms of surface area. In order to accelerate the Pi-Shell, one must apply an external force to the surface area of the Pi-Shell. However, there comes a point where the Pi-Shell *no longer has any surface area and cannot be acted upon.* This is where the Pi-Shell is traveling at or near to the Speed of Light. The lower half of the equation tends to zero, so mass (above the line) tends to Infinity.



1.21 Calculating the distance a Pi-Shell has traveled with a constant velocity

I have so far overlooked distance traveled by a Pi-Shell. How can one derive precisely the distance that a Pi-Shell travels in time t? Let's reconsider the diameter line diagram reflecting the speed at which a Pi-Shell is traveling relative to an Observer.



Therefore any observer Pi-Shell can travel at an upper speed of C, which means it will travel 186,000 miles in one second. In the case of 0.5 C, the Pi-Shell will travel 93,000 miles per second. The general form of this equation is to introduce the time variable t.

$$dis\tan ce = velocity * time$$

Relating this to an observer Pi-Shell, it can be rewritten as

$$dis\tan ce = observerdiameterline * observerpishelltime$$

The method works when all velocities are brought back to the same observer diameter line. The Einstein velocity addition and subtraction formulas show us how to do this. Also when v << C, the observer diameter lines are almost the same so one can simply add the velocities and multiply by time.

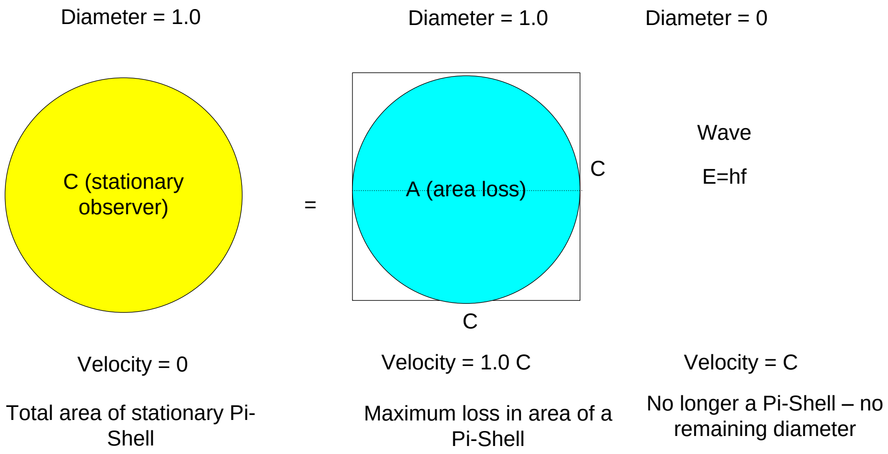
1.22 Pi-Shells and Newtonian Acceleration

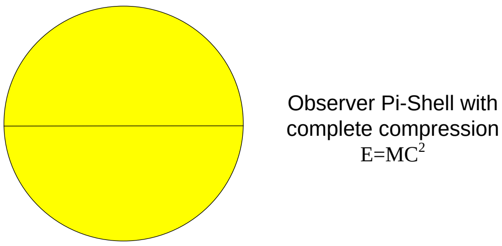
This is covered in the Gravity section. Later in the theory we show that acceleration is just area change of a Pi-Shell relative to an observer. There is also a Pi-Space derived version of Kinetic Energy derived in the Advanced Formulas.

1.23 Understanding $E=MC^2$

This is possibly the most famous equation in the world and part of the Special Relativity work by Einstein. This is the first reference to energy in the document. How does energy map to a Pi-Shell? Reading the equation, one can see that the energy of a Pi-Shell is related to the mass of the object times the total area that it can shrink by – which is the speed of light.

What exactly is mass? In Pi-Space, mass relates to the wave functions inside the Pi-Shell container. So, energy relates to the contained wave functions and the surface area of the Pi-Shell. The Einstein equation describes the total energy limit of a Pi-Shell as it relates to the total area of an Observer's Pi-Shell.





$$E = mc^2$$

The equation can be modified to include the Square Rule, this becomes

$$E = m\left(\pi c^2\right)$$

What the formula is telling us from a Pi-Shell perspective is that a stationary observer has a finite amount of area and the wave functions which exist within it. One can shrink this area only by the amount of area that the stationary observer has. The diameter of the observer's Pi-Shell constitutes velocities 0..C so when we have a velocity = C there is no more area remaining. When a Pi-Shell no longer has a diameter, it returns to its wave function form which is described in Quantum Mechanics.

So what happens when a Pi-Shell only partially loses some of its diameter? Where does this energy go? Energy is actually conserved within a Pi-Shell unless there is actual energy release. How energy is released from a Pi-Shell is discussed at the end of this section. Example types of energy release are Fusion, Fission and Anti-Matter release. Velocity does not release energy from a Pi-Shell. Potential Energy is transformed into Kinetic Energy. In the case where Potential Energy is transferred into Kinetic Energy and energy is conserved, this equates to the Wavelengths shortening within the Pi-Shell itself. A shorter wavelength (smaller Pi-Shell) has higher Frequency which maps to higher Kinetic Energy whereas a

Longer Wavelength (larger Pi-Shell) maps to a lower wave Frequency and a longer wavelength but has higher Potential Energy.

Summing up…

Einstein Energy maps to Total Pi-Shell area times the Mass of the Pi-Shell

Kinetic Energy maps to a shorter wavelength and higher Frequency
Potential Energy maps to a longer wavelength and lower Frequency

1.24 Newtonian Kinetic Energy

Newton defined Kinetic energy by examining the amount of force applied to an object (in this case Pi-Shells over distance d). Using this approach, he derived his formula for Kinetic Energy.

$$KE = mad$$

The initial velocity is zero and the final velocity is V_f over t seconds.

$$KE = m\frac{v_f}{t}d$$

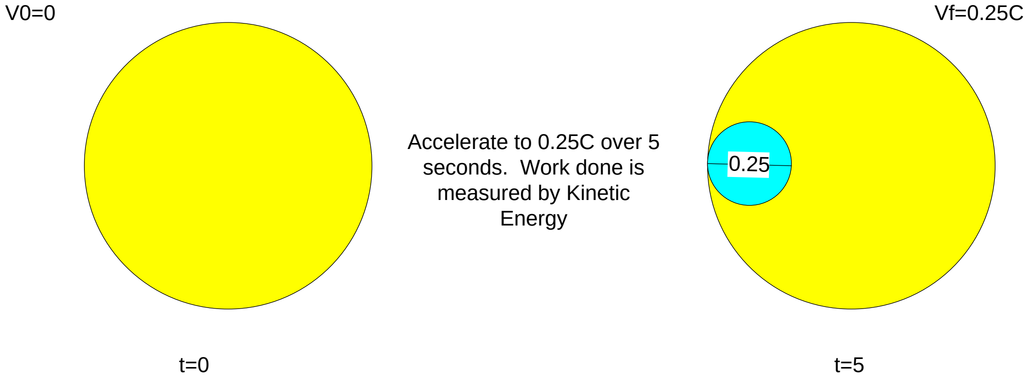
Distance d can be approximated with the average velocity concept

$$KE = m\frac{v_f}{t}\frac{v_f}{2}t$$

Leading to the well known Newtonian equation

$$KE = \frac{1}{2}mv^2$$

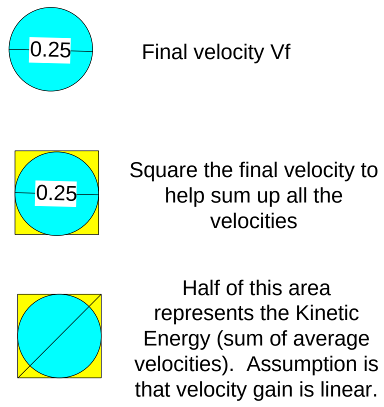
From a Pi-Space perspective, Newtonian Kinetic Energy is estimating that it is half of the shrinkage in area of V_f. Let's assume that a space ship goes from 0 to V_f 0.25C in 5 seconds.



Newton averages the acceleration using the average velocity concept. This works for V_f <<C but not for V_f <C because acceleration is non linear for a<C due to the rapid shrinking in area

of the Pi-Shell which is a squared function. We ignore this for now and assume that the average velocity concept works which it will for V_f <<C.

Therefore the Newtonian Kinetic Energy is an integral which sums up all the velocities to get from 0 to the final velocity. The assumption is that the velocity increase is linear so the final velocity is squared and half the area represents the summed velocities (or diameter lines). Newton evaded using an integral with this approach.



In Relativity, Einstein developed a Kinetic Energy Equation which we shall deal with next.

1.25 Einstein Relativistic Kinetic Energy

The Einstein Kinetic Energy equation defines the change in energy state of an object which is moving versus one which is stationary. Therefore, it's about the difference in total relative energy. Here we're not summing up the diameter lines, instead we're comparing two Pi-Shells and expressing the size difference in terms of their relative diameters.

$$KE = mc^2 - m_0c^2$$

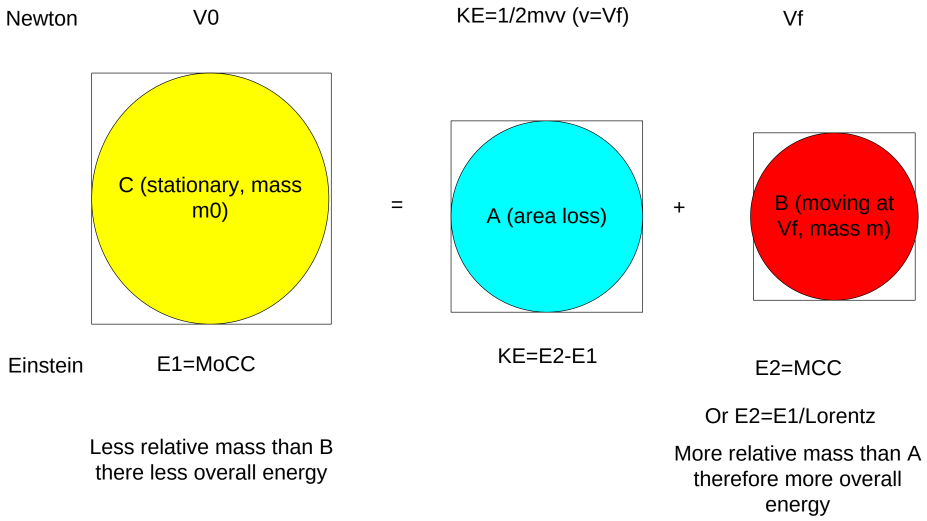
$$KE = mc^2 - m_0c^2$$

$$KE = \frac{mc^2}{\sqrt{1 - \frac{v^2}{c^2}}} - mc^2$$

Therefore we subtract the energy of a moving Pi-Shell from a stationary one. Variable m_0 is the stationary Pi-Shell mass. Expressed more explicitly, using the Lorenz Transformation, we obtain

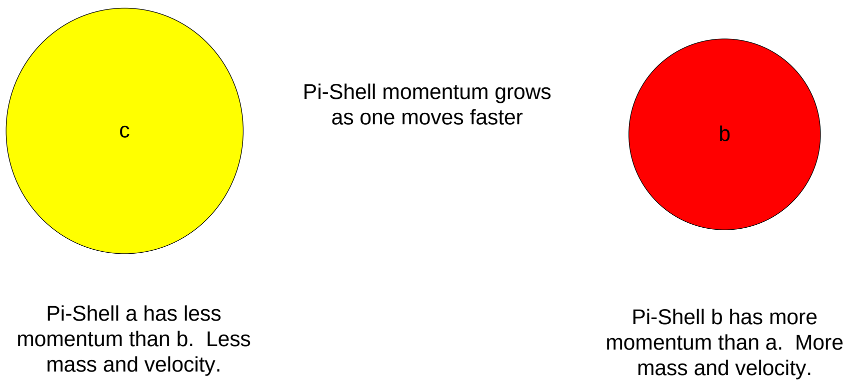
KE = moving Pi-Shell energy – stationary Pi-Shell energy

A moving Pi-Shell has more energy because it has more relative mass (which maps to a shorter wavelength). In Pi-Shell terms, Kinetic Energy is the Pi-Shell representing the difference in energy between the two Pi-Shells.

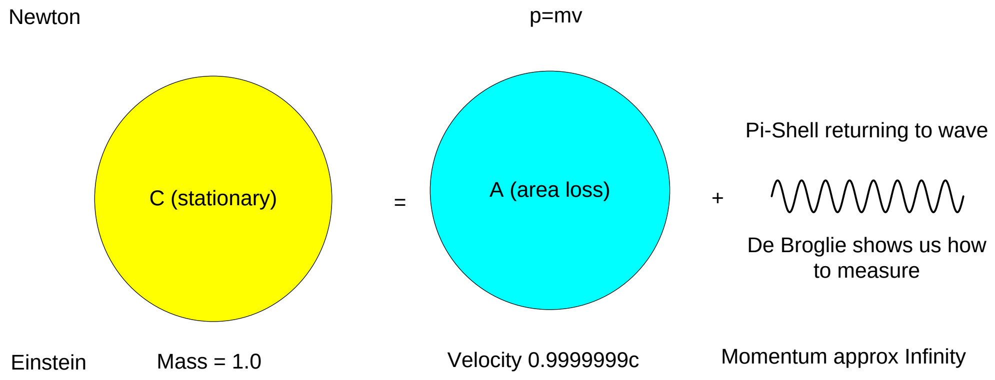


1.26 Relative Momentum and its utility

The Lorentz Transformation can also be applied to momentum as well as the mass property. Like mass, momentum is a property of a Pi-Shell. The momentum of a Pi-Shell is related to mass times the velocity and described by p. What is the usefulness of momentum? If we have mass, should that not be enough? From a pure Pi-Shell perspective, it is sufficient however, momentum is a more accurate representation of the underlying building blocks of a Pi-Shell. The building blocks are the wave functions on the surface and they are ultimately responsible for the movement of the Pi-Shell. The momentum calculation aids us in measuring the underlying wavelength on the surface of the Pi-Shell because mass and velocity are Pi-Shell properties that comprise the wavelength. Therefore at V<C, when the surface area of a Pi-Shell has almost disappeared, momentum gives us a way to map to measure the underlying wavelength ‘driving’ the Pi-Shell. Think of momentum as Pi-Shell’s way of providing a mapping to the Quantum view.



$$p = \frac{m_0 v}{\sqrt{1 - \frac{v^2}{c^2}}}$$

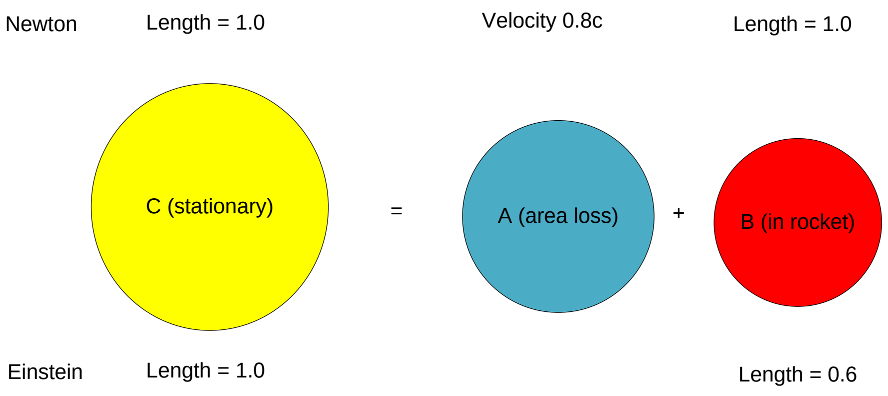


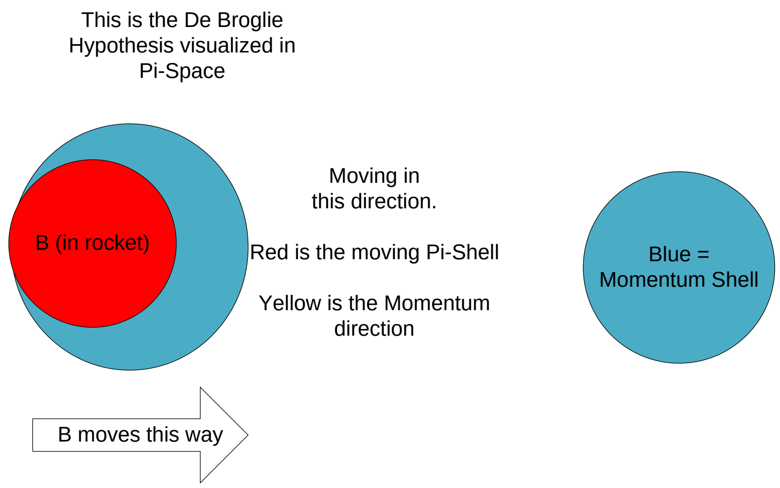
Louis De Broglie made the intuitive leap of imagination and mapped momentum to the Quantum wavelength using his Nobel winning formula

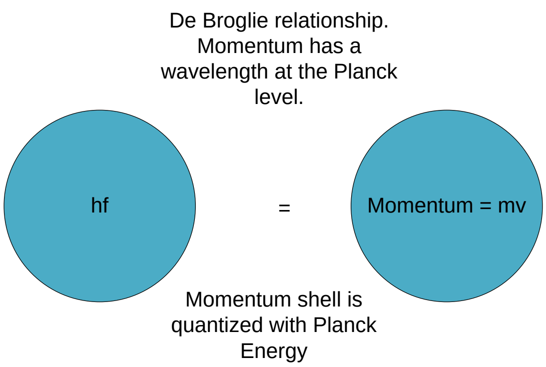
$$\lambda = \frac{h}{p} = \frac{h}{mv}$$

The value h is Planck's constant. To a certain extent we are moving out of the Pi-Shell view of things but the key point to understand is that momentum is a really powerful tool for mapping to measuring the wavelength within a Pi-Shell.

In the document called "The Particle, The Wave And The Momentum Shell" the Momentum Shell is defined where the we move beyond the idea of the Pi-Shell purely as a particle and produce a diagram like the following. Please read this document for further information.

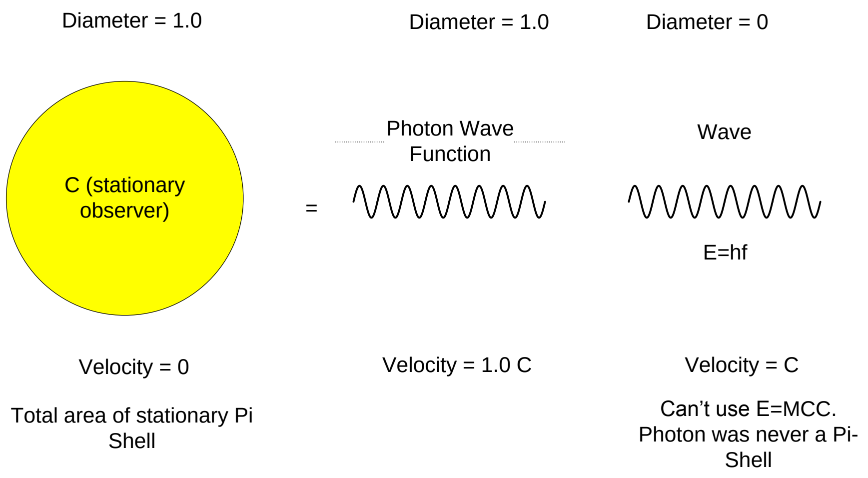






1.27 Measuring the Energy of a Photon

A Photon travels at the speed of light and has momentum however it has no mass. The Photon is an edge case because it is not a Pi-Shell but we attempt to measure it using Pi-Shell concepts. However, it has no surface area or a diameter. Therefore it makes no sense to use Einstein's energy formula. However, it does have momentum and this is where the momentum concept is stronger than the mass concept because it can be used to represent a Pi-Shell collapsing to a wave function, or being one. With a Photon we are dealing with a wave function. In this case we use the energy formula for a wave function which uses Planck's constant and the frequency of the wave.



1.28 The Pi-Shell Unit of Velocity and the Wavelength λ

So what is the relationship between the Pi-Shell Unit of Velocity and the Wavelength of the wave functions which constitute the Pi-Shell? The answer is that the Unit of Velocity is a Classical way of describing a change in the relative Quantum Wavelength of the Pi-Shell. Louis De Broglie defined the relationship between velocity and the wavelength λ as

$$\frac{h}{mv}\sqrt{1-{v^2}/{c^2}}$$

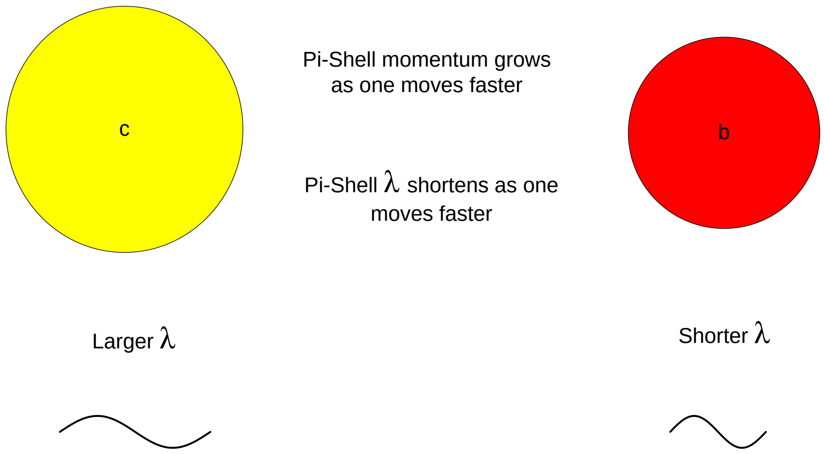
where h is Planck's constant and mv is the Pi-Shell's momentum.

So what does it mean to state that at v=0, that λ=∞? Let's recap what velocity means; it's a relative measure based on a velocity relative to an observer (v=0 velocity). However, in absolute terms one is moving, therefore one has an absolute λ at all times, which is not catered for in the De Broglie formula, even if one is stationary in the relative sense. The De Broglie formula is a relative formula which *maps a relative shortening of the diameter of the Pi-Shell to a relative shortening of the wavelength.* The wave itself is distributed around the origin as it moves around the center of the Pi-Shell. However, in the case where there is no relative shrinkage of the Pi-Shell diameter, relative to the observer, there is no wavelength shortening due to motion. *So λ=∞ means that there is no relative shortening of the wavelength.* It does not mean that λ is physically ∞. What it means is that the absolute λ remains unchanged and we do not have a value for this in the same way that we do not have an absolute velocity.

Note that in this formula we use the Lorentz transformation to compare the Observer's Pi-Shell with the moving Pi-Shell. In the same way, that this formula scales the Pi-Shell Unit of velocity for time, length and mass depending on the differences in size of the differing Pi-Shells, this formula also scales the λ as it is related to the area of the Pi-Shell too. As one approaches C, the relative λ shrinkage due to velocity decreases. By the time one has reached C, the only possible λ shrinkage is 0.

So momentum p (mv) is the Classical way to represent the Pi-Shell wave function. The combination of these two Classical variables represents a single relative λ. Planck's constant

h represents the Quanta of energy that each λ contains. So if velocity and mass map to λ, then what about the previously defined variables speed, distance and time etc; How to they map to a λ?



1.29 Where does Pi-Shell momentum ultimately come from in a Pi-Shell?

Momentum is a Pi-Shell phenomenon but originates from the waves which make up the surface of the Pi-Shell. Momentum in a Pi-Shell is the product of a difference in the wavelength at different points on the surface of a Pi-Shell. All waves travel at the speed of light on a Pi-Shell but the difference in the wavelength means that the frequency is different at certain points. Therefore the Pi-Shell is unbalanced in terms of the force each wave is exerting at different points on the surface of the Pi-Shell. *This difference causes the Pi-Shell to have relative momentum and it moves in a particular direction with what we call mass times a velocity v. The shorter the wavelength at a certain point on the surface of the Pi-Shell, the greater the force in a particular direction.*

Mapping Relative λ to Pi-Shell Properties	***Observer versus Action Pi-Shell***
λ of a Pi-Shell to velocity v	Use the De Broglie formula which maps a Pi-Shell unit of velocity to a λ
Unit of Length	Pi-Shell Unit of length (diameter) shrinks as the λ shrinks
Unit of Time	Pi-Shell Unit of time, clock-tick, (diameter) shortens (slows) as the λ shrinks
Unit of Mass	Pi-Shell Unit of mass increases as the λ shrinks (and frequency of wave increases)
Distance traveled	Distance traveled increases as λ shrinks.

1.30 Minkowski and the Invariance of the Interval

Einstein worked with Lorenz to produce the Lorenz Transformation in Special Relativity. I've shown how this relates to Pi-Shells. Of interest should be the fact that there has been no need to use the idea of clocks and rods which is the way SR is traditionally taught and what the reader should expect to find in a more traditional book on this subject. Shortly after the formulation of SR, Herman Minkowski refined SR and produced the idea of Space Time in which he explained that our reality has a forth dimension whose dimension is time. He produced a formula which showed the invariance of the interval for different observers. The interval is defined by s^2.

$$s^2 = x^2 + y^2 + z^2 - (ct)^2$$

He argued that the interval is a special form of Pythagoras' Theorem in which time is a component of this. I have already shown this in the sections above using the Pythagorean Theorem. The formula for the interval at the Speed of Light is

$$x = vt$$

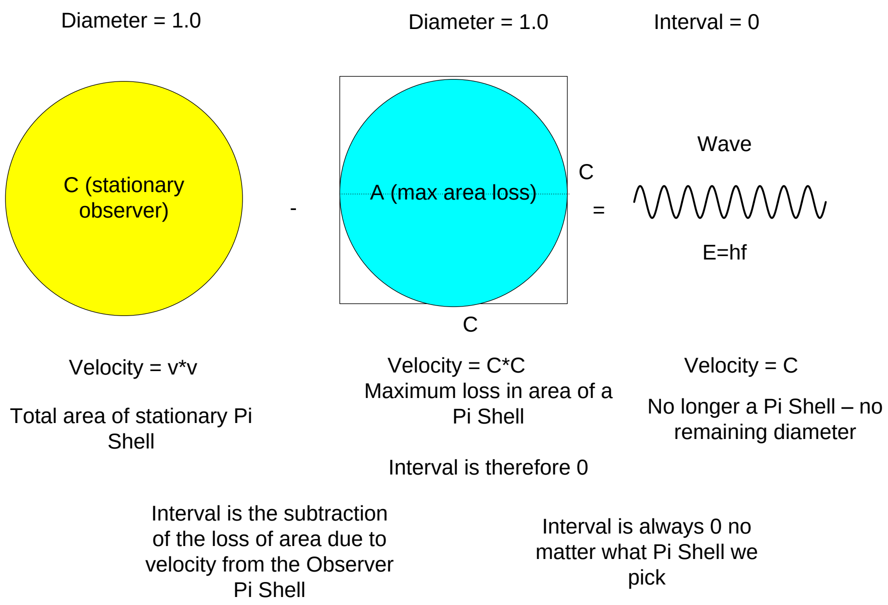
$$s^2 = (vt)^2 - (ct)^2$$

When v=c, we see that the interval is zero.

$$s^2 = (ct)^2 - (ct)^2$$

$$s^2 = (c^2t^2) - (c^2t^2)$$

Therefore the interval will be zero for all observers' no matter what their frame of reference. So how does this fit into the Pi-Space framework? Firstly, *a Pi-Shell is another way to represent Minkowski Space Time.* A Pi-Shell has implicit time which is related to the Observer's time. Pi-Shell time, which is relativistic, is a property of a Pi-Shell rather than another dimension. The interval is the Observer Pi-Shell subtracted from the shrinkage of the other Pi-Shell (in this case due to velocity). When s is zero, the Pi-Shell can no longer be shrunk and therefore the interval is zero. This is true for all Pi-Shells no matter what frame of reference we are dealing with so the Interval is always Invariant, using the Minkowsky terminology.



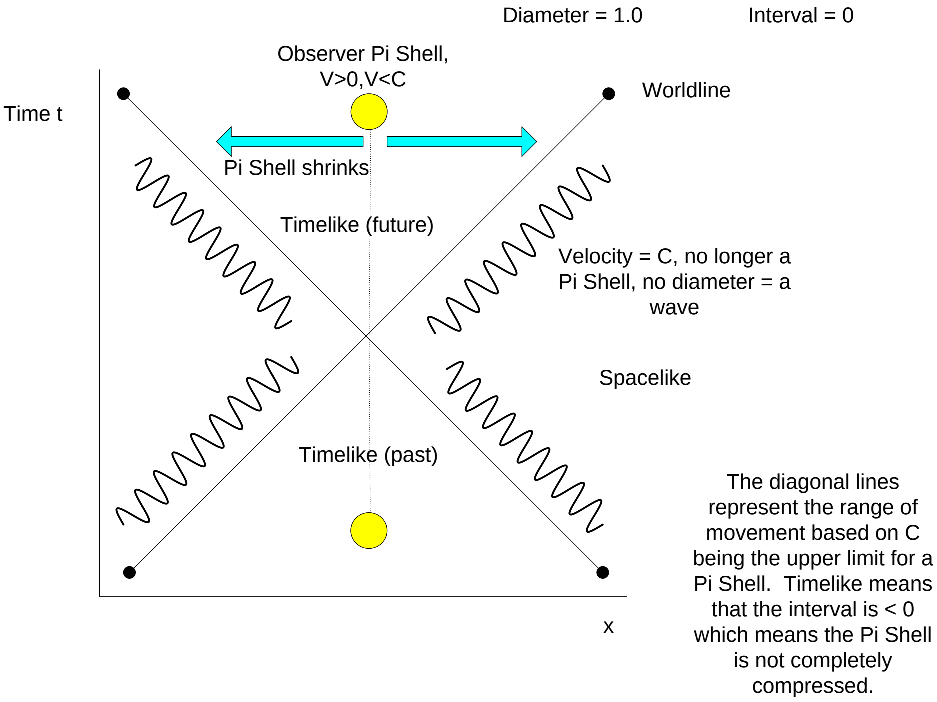
Note the time t is a constant and based on the Observer's time. Minkowski opens up a whole range of two-dimensional space time diagrams which explain SR in this form. Pi-Space is another way to represent these diagrams but in a three-dimensional form.

Note that as the Pi-Shell moves faster, the Pi-Shell shrinks and time passes more slowly for it. Therefore time is an implicit property of a Pi-Shell. The Minkowsky work adds interpretations of the interval values and offers two dimensional diagrams which are not required for Pi-Space. However, I have them here for completeness but not in great detail. Please read the standard SR texts if you're interested in more detail.

1.31 Relating Space Time Diagrams to Pi-Shells

Minkowsky produced Space Time Diagrams in which he mapped time (on the y axis) to distance on the x axis. The underlying upper limit of speed for anything in reality is the speed of light. One can pick a point and draw two forty-five degree angled world lines at that point. World lines represent an object moving within Space Time. If this were extended into three dimensions, this would form a three dimensional cone above the cn point and another cone below the point. In the diagram, we chose only the x-axis. The edges of the cone represent the maximum speed at which one can travel. The edges of the cone represent a Pi-Shell which is completely collapsed to a wave form, or represents light for example. The light cone above and below the point is regarded as time like (future event from the intersection point). Areas outside the cone are deemed space like. The points on the surface of the cone are null because the Pi-Shell is completely collapsed. The interval is defined as

$$s^2 = x^2 + y^2 + z^2 - (ct)^2$$



There are three Minkowsky interpretations to the interval value.

Interval < 0 is deemed timelike
Interval =0 is deemed null
Interval >0 is deemed spacelike

Roughly translating these values to Pi-Space

Interval < 0 (timelike): This means that the Pi-Shell is traveling at <C and it's not completely compressed
Interval =0 (null or sometimes called lightlike): This means that the Pi-Shell is traveling at C and is completely compressed. It has maximum Pi-Shell compression.
Interval >0 (spacelike): This value is not possible for a Pi-Shell, traveling >C. It refers positions outside the diagonal lines in the diagram. Here, a Pi-Shell has returned to a Quantum Form and operates using Probability Theory.

Traditional Special Relativity has clocks, rods and worldlines

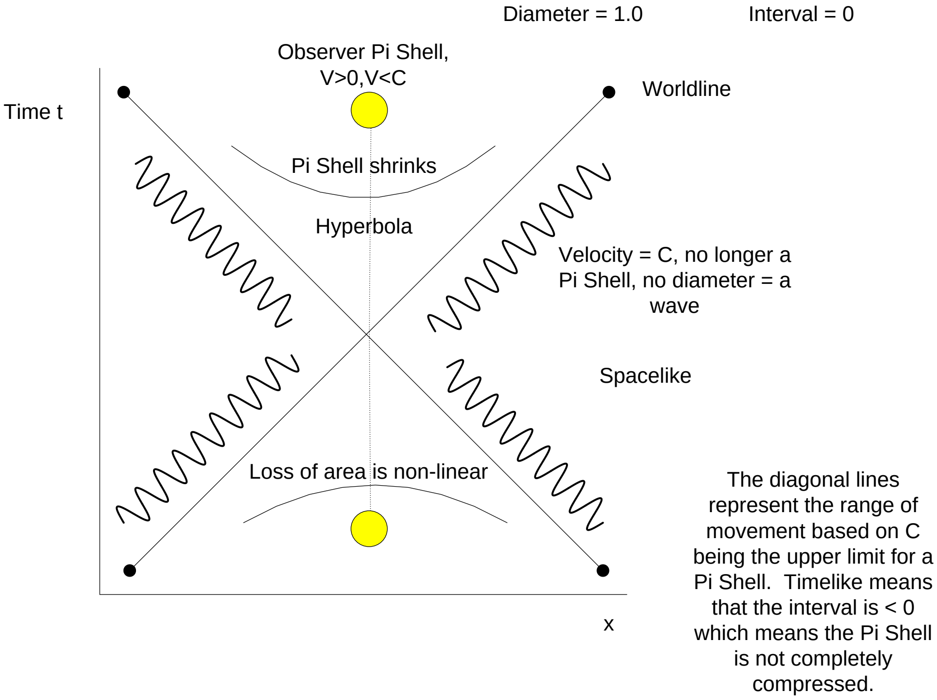
Rods: Are composed of Pi-Shells which grow shorter as one increases velocity. The scaling factor is related to the changing Interval.
Clocks: Each Pi-Shell has a built in clock which runs slower the faster it moves (as it shrinks in diameter).
Worldlines: These diagrams measure time versus position. Each Pi-Shell has a position x and time t in Space Time. A planet's orbit is therefore a spiral worldline.

Space Time Diagrams and the Invariant Hyperbolae

One of the next logical steps one can make is to realize that the dimensionality is non linear. The axes t and x indicate a linear nature. A more accurate way to represent this using the Space Time diagrams is to have what is termed the Invariant Hyperbolae. Space Time is essentially warped. In Math this is (simplified) expressed by

$$-t^2 + x^2 = a^2$$

In the diagram we can show that as the Pi-Shell shrinks, it loses the area in a non-linear manner.



Using this understanding, Lorenz was able to work out his equations. In Pi-Space, we can show how these relationships are equivalent.

1.32 Explaining the SR Paradoxes in Pi-Space

There are two well-known Paradoxes in SR. The first one is the Ladder in the barn and the second one is the twins' paradox.

The first point to make about the Paradoxes is that A moving relative to B is not the same a B moving relative to A. What do I mean by this? Well, if a car passes you at 20 MPH the Pi-Shells of the moving object are smaller. If you pass a car at 20 MPH your Pi-Shells are smaller. Part of the confusion on the part of those who propose the Paradoxes is that they think that A moving relative to B is the same as B moving relative to A. In Pi-Space this would be like saying although A is moving faster than B, A's Pi-Shells are the same size as B's which is incorrect.

Let's take the example of the ladder in the barn. If the ladder is longer than the barn and it is traveling at a speed where it is length contracted, it will fit into the barn. This is the ladder A traveling relative to the barn B.

However, if the barn B is traveling relative to the ladder A then the barn B is shorter than the ladder A. The ladder A is longer than the barn B. Observers in the barn will see different results at it passes through the barn depending on which object is traveling relative to the other. There is a lot of confusion around this. The Minkowsky diagrams attempt to explain it but it's not an easy thought experiment without Pi-Shells. The way Einstein explained this was by calling this Relative Simultaneity by explaining that Observers see different results depending on their frames of reference (moving or not).

It is stated that this breaks the principle of non-locality in Quantum Mechanics but the key amendment in understanding this is that we're dealing with Pi-Shells which have varying mass density (diameters). QM deals with probability waves which do not have diameters so this is a consequence of a Pi-Shell, not a wave.

The next example is a similar idea but deals with time dilation. One twin leaves Earth and goes on board a space ship and travels near the speed of light and then returns home. The twin who has been traveling is now younger than the one which remained on Earth. The misconception is that there is no difference in the Pi-Shells between the twin on Earth and the twin traveling at speed. Why can't the twin on Earth be younger instead some wonder as it's all relative motion? However, the twin who is on board the Space Ship has smaller Pi-Shells due to acceleration (shrinking Pi-Shells) and therefore time moves more slowly than the twin on Earth who has larger Pi-Shells. Once the acceleration is over, the Pi-Shells remains in that smaller size and travels at what we term a constant velocity which means Pi-Shells of the same (although smaller) size. The twin returns to Earth by decelerating in the Space Ship. Deceleration means making the Pi-Shells larger and returns home. When they meet, both twins have Pi-Shells which are the same size. Again, the mistake is in thinking that one velocity relative to another are Pi-Shells of the same size. To achieve relative motion a Pi-Shell must shrink relative to another Observer Pi-Shell. The waves which make up the Pi-Shell are the ultimate driver of motion of the Pi-Shell.

One of the consequences of Pi-Space is figuring out what happens when a Pi-Shell shrinks. Does it flatten into a pancake so-to-speak? In Pi-Space, the Pi-Shell does **not** flatten into a pancake/ellipse. In fact, the **whole** Pi-Shell shrinks in terms of its diameter so all the Pi-Shells building the frame of reference shrink. What this means is that if you are inside a Space Ship, you will not be aware of length contraction. The whole ship will be contracting and you will be miniaturized so-to-speak. This is why Observers in different frames are not aware of the Einstein length contraction as it is to the diameter of the Pi-Shell which is the building block of their frame of reference. Everything is shrunk by the same amount (assuming you're traveling at a constant velocity v). There is length contraction in Pi-Space but it is to the diameter of the Pi-Shell.